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Sales Force Automation System

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WXES3182

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ABSTRACT

This study of project is the fulfillment for WXET 3181 and WXET 3182. The entire project, named Sales Force Automation System (SFA System), involves developing a web based interaction system for the use of the sales representatives and administrator of a company. This system will be built in a simple, high quality and fast way by using certain tools. The objective for developing this SFA System is to keep track of the information about the customers, sales persons, sample movement, company and product. There will be a database which all data will be kept in the database and can be retrieved easily. The system also will include user friendly feature.

In consideration of providing these advance features, Active Server Pages 3.0 has been chosen as the developing language, with the database support by Microsoft Access 2000, in the platform of Windows 2000, running with server IIS 5.0. Besides, to guarantee the feasibility and accuracy of the final production, the Waterfall with prototyping methodology has been utilized throughout the stages of the entire development progress. With the distinct division of two modules, which is the administration and the sales representatives Area Planning modules, the entire operation of SFA system is manageable and systematic, with each performing it respective roles. With reference and review from the other systems, the additive enhancement of features and cautious consideration of the existing constraint in real working environment, is expectedly leading this project to the future implementation in the faculty, with minimum limitations

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CHAPTER 1 INTRODUCTION

This chapter gives an introductory description about the thesis project that have been chosen. Project definition, background, study objectives, its rationale and scope are addressed. Schedule of project development and contributions in future are also included.

1.1 PROJECT DEFINITION

The title of this thesis is Sales Force Automation System. It is a CRM system focused on Sales Force Enablement. Through this system, application for Sales such as Call Report, Expense Claims, Productivity report and Contact Management is being created.

Sales Force Automation System is mainly a system which assists sales representatives in such a way that they can keep track of the information about the customers, sales persons, sample movement, company and product. Consequently, it not only saves time and manpower in solving certain problems, it also increases the level of effectiveness in terms of synchronizing the tasks among each sales representatives and administrator electronically.

This is a typical web-based system which uses the Internet to present and retrieve data via browser. Basically, the system contains a database, web server and client server to allow information transactions. In this way, it allows users to access the application at any location and any time, as long as the users have access to the Internet

1.2 PROJECT BACKGROUND

In this project, the application will download information from a central server. After synchronization, users can then use the application as in their daily job activities. The data is then synced back to the central server.

The features of the Sales Force Automation system are

- Search for information on Customers and Company
- Make call reports when they visit customers
- Make Non Call reports when not visiting customers
- Make Sample movement report when receive samples

- Search for information on Products

1.3 PROJECT OBJECTIVES

The system to be implemented is a CRM system focused on Sales Force Enablement. This system is used to provide sales representatives with a system that can aid them in their daily activities.

This thesis has a few major objectives as shown below:

- Make the sales representatives' job easier
- Reduce sales representatives' workload
- Record sales information
- Record non-sales information like training and conference
- Provide basic inventory functionalities
- Record customer information
- Record company information
- Record product information

1.4 PROJECT SCOPE

The system to be developed is basically a Sales Force Automation (SFA) system that is used to enable sales representatives from a company in their daily activities.

The primary goal is to build the components in the sales representatives Area Planning module. The components to be built are

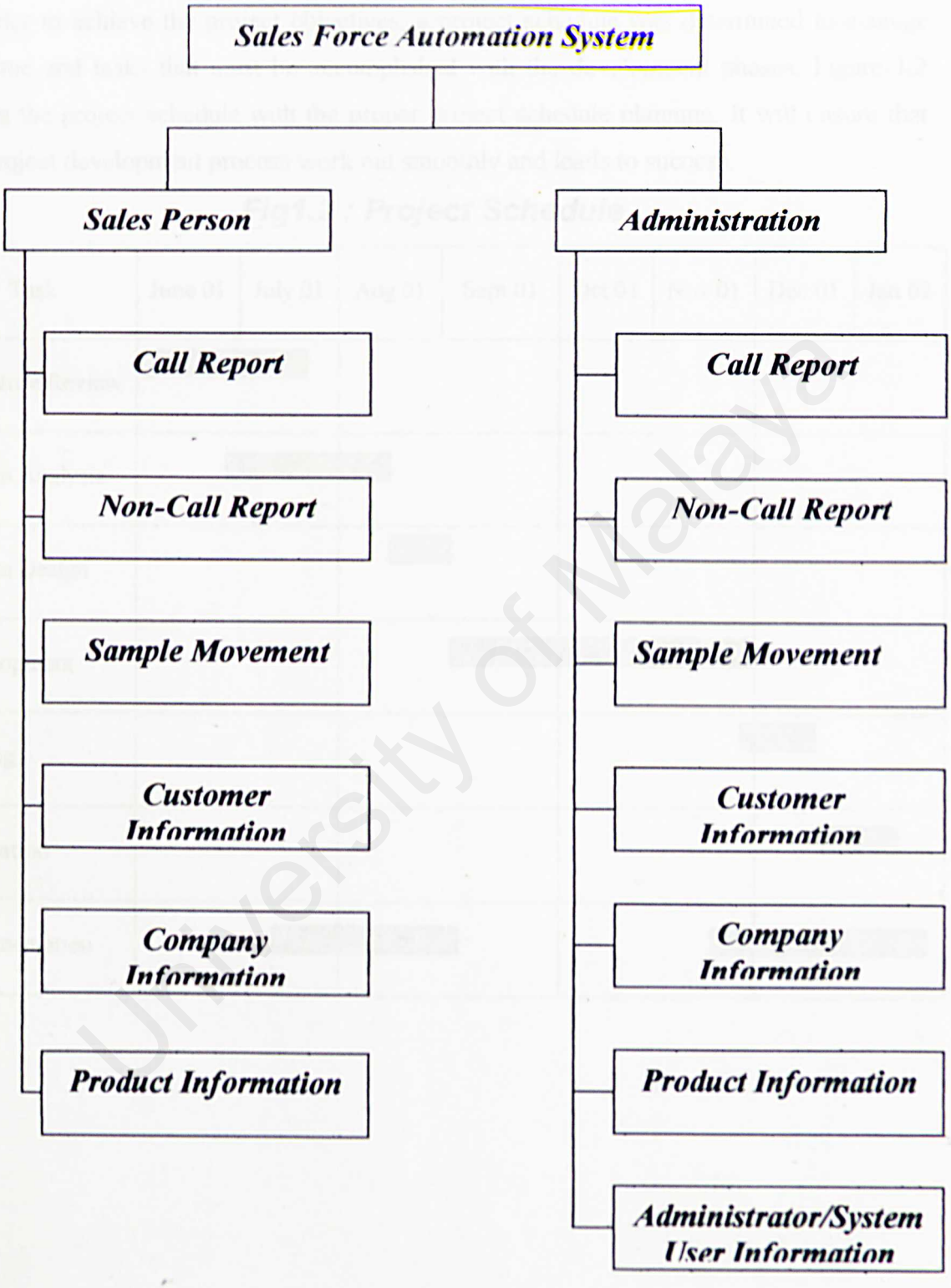
1. Call Report (Add, View and Search functionality)
2. Non Call Report (Add, View and Search functionality)
3. Sample Movement (Add, View and Search functionality)
4. Customer Information (Add, View and Search functionality)
5. Company Information (Add, View and Search functionality)
6. Product Information (View and Search functionality)

The secondary goal is to build the components in the administration module. The components to be built are

7. Call Report (Add, View and Search functionality)

8. Non Call Report (Add, View and Search functionality)
9. Sample Movement (Add, View and Search functionality)
10. Customer Information (Add, View and Search functionality)
11. Company Information (Add, View and Search functionality)
12. Product Information (Add, View, Delete and Search functionality)
13. Administrator / System User (Add, Edit and Delete functionality)

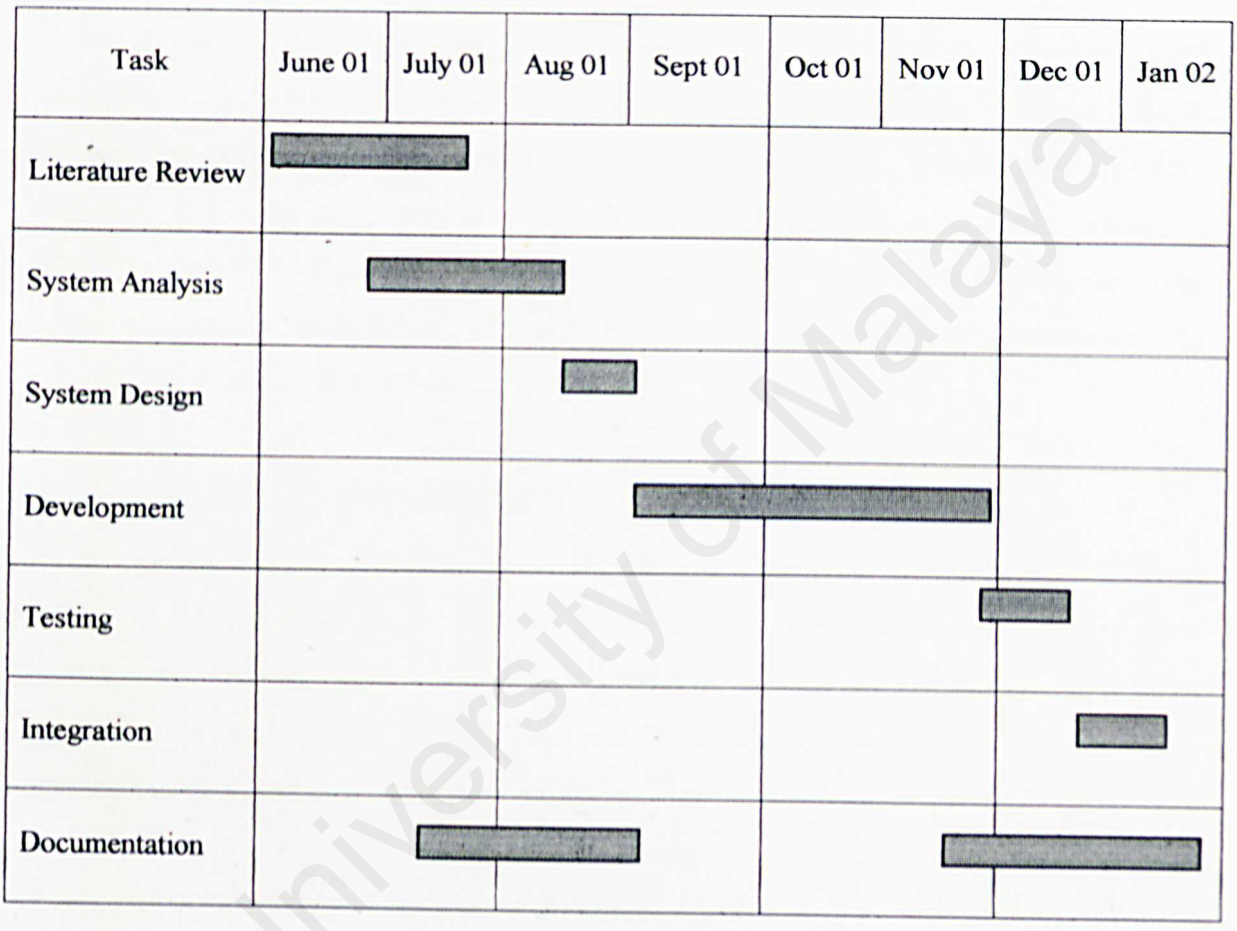
Fig1.1 : Modules shown in chart



1.5 PROJECT SCHEDULE

In order to achieve the project objectives, a project schedule was determined to manage the time and tasks that must be accomplished with the development phases. Figure 1.2 shows the project schedule with the proper project schedule planning. It will ensure that the project development process work out smoothly and leads to success.

Fig1.2 : Project Schedule



1.6 SUMMARY

After the project objectives and scope are well understood, some researches have to be carried out to ensure the system run smoothly. Next chapter considers some literatures related to this project.

CHAPTER 2 LITERATURE REVIEW

Development of a reliable and consistent system, required detailed research as well as careful planning. To ensure deep understanding of the system that is to be developed, extensive research was conducted in several areas through library, Internet and Bilik Dokumen FSKTM.

In the process of developing Sales Force Automation System (SFA), researches have been done to understand various new concepts of SFA. A research has been carried out to compare the current existing system with the SFA, which will be developed. Some sites related to SFA were also observed and analyzed in this project. Additionally, studies in this project involved the fields of Internet/Intranet, World Wide Web (WWW) and Web based application components. Researches also have been done to understand the client/server concepts and architecture.

2.11. BACKGROUND SURVEY

In this section, a research has been carried out to compare the current web-based SFA system with the system I want to develop. These were measured from several criteria such as cost, storage, human intervention, efficiency and so on. Observation also being conducted on the web sites that also implied the similar system. A part from that, new approach of SFA will also be discussed .

A Survey on Existing Web-based System

The existing web-based system is nearly the same. It also implemented according to two major goals. The primary goal is to build the components in the sales representative Area Planning module. The components to be built are like Call report, Non-call report, Sample Movement, Customer Information, Company Information and Product Information. The secondary goal is to build the components in the Administration module. The components to be built are the same as first module but add two more – Add, Edit, Delete Administrator, User and Product.

New Approach

New features are needed to be added to support and improve the interaction between sales persons and administrator in the company.

- User friendliness

  Developed SFA System offers much simpler and easier way to record all the necessities info whenever sales persons.

- Effectiveness

  They can record down whatever needed at any place and time.

- Security

  Only authority persons are allowed to login the system and access the data.

- Accuracy

  Developed SFA System can process the records more accurately.

2.12. INTERNET AND INTRANET

Internet

The Internet, sometimes called simply "the Net," is a worldwide system of computer networks - a network of networks in which users at any one computer can, if they have permission, get information from any other computer (and sometimes talk directly to users at other computers). It was conceived by the Advanced Research Projects Agency (ARPA) of the U.S. government in 1969 and was first known as the Advanced Research Projects Agency Network. The original aim was to create a network that would allow users of a research computer at one university to be able to "talk to" research computers at other universities. A side benefit of ARPANet's design was that, because messages could be routed or rerouted in more than one direction, the network could continue to function even if parts of it were destroyed in the event of a military attack or other disaster.

Today, the Internet is a public, cooperative, and self-sustaining facility accessible to hundreds of millions of people worldwide. Physically, the Internet uses a portion of the total resources of the currently existing public telecommunication networks. Technically,

what distinguishes the Internet is its use of a set of protocols called TCP/IP (for Transmission Control Protocol/Internet Protocol). Two recent adaptations of Internet technology, the intranet and the extranet, also make use of the TCP/IP protocol. For many Internet users, electronic mail (e-mail) has practically replaced the Postal Service for short written transactions. Electronic mail is the most widely used application on the Net. You can also carry on live "conversations" with other computer users, using Internet Relay Chat (IRC). More recently, Internet telephony hardware and software allows real-time voice conversations.

Using the Web, you have access to millions of pages of information. Web browsing (see surf) is done with a Web browser, the most popular of which are Netscape Navigator and Microsoft Internet Explorer. The appearance of a particular Web site may vary slightly depending on the browser you use. Also, later versions of a particular browser are able to render more "bells and whistles" such as animation, virtual reality, sound, and music files, than earlier versions.

Intranet

An intranet is a private network that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased lines in the wide area network. Typically, an intranet includes connections through one or more gateway computers to the outside Internet. The main purpose of an intranet is to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferences.

An intranet uses TCP/IP, Hypertext Transfer Protocol, and other Internet protocols and in general looks like a private version of the Internet. With tunneling, companies can send private messages through the public network, using the public network with special encryption/decryption and other security safeguards to connect one part of their intranet to another.

Typically, larger enterprises allow users within their intranet to access the public Internet through firewall servers that have the ability to screen messages in both directions so that company security is maintained. When part of an intranet is made accessible to

customers, partners, suppliers, or others outside the company, that part becomes part of an extranet.

2.13. ABOUT WWW

A major reason for the accelerated growth of the Internet in the last few years is the World-Wide Web, a simple yet ingenious system that allows users to interact with documents stored on computers across the Internet as if they were parts of a single hypertext.

The Web began in 1992 at CERN, the European Laboratory for Particle Physics, as a means of distributing and annotating scientific research. Technical standards are now defined by the World-Wide Web Consortium. The creators of the web specified three sets of rules for creating, publishing, and finding documents:

HTML (Hypertext Markup Language)

Web documents are ordinary text files that can be created with any word processing program. They include tags that control their appearance. For example, the boldface above is achieved with these tags:

Tags can also define a word or phrase as a link. Selecting a link lets the user go to another document (or to another section of the same document). HTML documents (often called "pages") can also include color graphics, animations, and digitized audio or video. Users need a web browser program (for example, Netscape Navigator or Microsoft Internet Explorer) to view web pages.

HTTP (Hypertext Transfer Protocol)

Users of the web retrieve documents from servers (or "web sites"). HTTP allows a networked computer to listen for and respond to incoming requests for files ("hits"). Simple and reliable, HTTP is often a more cost-effective solution than traditional paper publishing.

URL (Uniform Resource Locator)

A URL is the Internet address for a web document or other file. A typical URL looks like this:

Web users can retrieve documents either by manually entering URLs or by selecting links that contain a URL. Later in this tutorial, URLs are discussed in more detail.

The web grew tremendously in popularity after the release of a free browser program, Mosaic, by the University of Illinois' National Center for Supercomputing Applications. NCSA Mosaic provided an easy-to-use, graphical interface to the web that behaved the same on UNIX, Macintosh, and Windows computers. When Mosaic was released in the spring of 1993, there were about 130 web sites on the Internet. By November 1994, this number had increased to more than 10,000.

While other browser programs such as Netscape Navigator and Internet Explorer are now more widely used, NCSA Mosaic has been a critical factor in the growth of the World-Wide Web.

2.14. WEB SECURITY ISSUES

The most important factor that delays the Internet adoption is connected with the security. Here, security includes hacker incidents, computer viruses, online theft and the breaking of encryption schemas. The growing trend towards connecting WWW servers with corporate database raises security concerns.

Security on the web involves both client and the server. Currently, most of the Web security technology is focused on solving the four immediate problems as below:

Encryption

Encryption is an important tool in computer security. Users must understand that encryption does not solve all computer security problems. Furthermore, if encryption is not used properly, it may have some side effect on the performance of entire system. However, weak encryption may even be worse as it gives an unwarranted sense of security. Therefore, it is important to know the situation in which encryption is useful and to use it efficiently.

Authentication

As in computing, it is not that secure where anyone can just attempt to login to a computer system. The most common authentication mechanism is a password, in which only the authorized users know the key. However, although this seems to be a secure system, but due to some unethical behavior of humans leads to its quality degradation.

Firewalls

A firewall is a gatekeeper computer that sits in between the Internet and the network. It protects the private network by filtering traffic to and from the Internet based on the defined policies. Firewalls are used to define who can get on to the network and when ones' can get to access it. A firewall typically provides two network interfaces. One of it connects to the internal protected network, and the other connects to the external unprotected network.

Non-repudiation

This means, uncontestable proof that a document or message was really originally, originated by oneself. As for this security problem, it requires some unforgeable electronic signature that can be used in a court of law.

Security Protocol

Currently, the Web supports two security protocols, which are Netscape's Secure Sockets Layer (SSL) and EIT's Secure HTTP (S-HTTP). SSL is important because most popular browser on the Web supports it, which is Netscape Navigator.

As for, S-HTTP, it is a more complete solution where Spry Mosaic and NCSA support it, Mosaic browser as well as other Mosaic clones. In many ways, the SSL and S-HTTP protocols complement each other. Both of it, support public key encryption to encrypt data, authenticate users, and to provide non-repudiation via electronic signatures. However, most servers will end up supporting both protocols.

2.15. CLIENT / SERVER ARCHITECTURE

Client/Server computing is a currently attracting the most interest among management information system professionals. The popularity of this approach is due to its ability to allow companies to selectively centralize and decentralize certain key operations. Thus, users can view client/server computing as a cross between the timesharing method (which emphasized centralized computing) and distributed processing (which emphasized decentralized computing). In client/server computing, the various application available in the network are shared by several clients and one or more host computers (or servers). Clients obtain access to the network by means of desktop computer. The server, which can be a microcomputer, minicomputer or mainframe, provide control for the entire network.

Many definitions of this architecture exist ranging from an access application with a share database to an all-encompassing transaction processing system across multiple platforms and databases. Throughout all the permutation and combination, some major themes remain consistent.

Request / Provider Relationship

The client and the server have well-defined rules, the client requesting a service and the server fulfilling the service requestor.

Message-based

The communication between the client and server is a well-defined set of the rules that govern all communication – a set of transaction that the client sends to be processed.

Platform Independence

Due to the clearly defined roles and message-based communication, the server and service provider is responsible for fulfilling the request and returning the requested information (or completion code) to the client. The incoming transaction can be form a window client, an OS/2 machine, or a web browser.

Dynamic Routing

The client can send a transaction to a service provide and have the request fulfilled without having to be aware of the server that ultimately fulfill the request. A database server, a mid-range data update or a mainframe transaction might satisfy the data or transaction.

Two-tier Client/Server

2-tier architectures consist of three components distributed in two layers: client and server. The three components are ***User System Interface*** (such a session, text input, dialog and display management services), Processing Management (such as process development, process enactment, process monitoring and process resource services), and Database Management (such as data and file services).

The 2-tier design allocates the user system interface exclusively to the client. It places database management on the server and splits the processing management between client and server, creating two layers. In general, the user system interface client invokes services from the database management server. In many 2-tier designs, most of the application portion of processing is in the client environment. The database management server usually provides the portion of the processing related to accessing data (often implemented in store procedures). Clients commonly communicate with the server through SQL statements or a call-level interface. It should be noted that connectivity between tiers can be dynamically change depending upon the user's request for data and services.

The flexibility and usability to provide a customized user system interface makes 2-tier architecture more suitable to be used in non-complex, non-time critical information processing system. Anyway, 3-tier client/server has become another popular alternative of system architecture in developing more complex applications.

Three-tier Client/Server

3-tier distributed client/server architecture includes a user system interface top tier where user services reside. The middle tier provides the process management services that are showed by multiple application. The third tier provides database management

functionality and is dedicated to data and files services that can be optimizes without using any proprietary database management system languages. The data management component ensures that the data is consistent throughout the distributed environment through the use of features such as data locking, consistency and replication. It should be noted that connectivity between tiers can be dynamically change depending upon the user's request for data and services.

The middle tier server, which is referred to as the application server improve performance, flexibility, maintainability, reusability and scalability by centralizing process logic. Centralized process logic modes administration and change management easier by localizing system functionality so that changes must only be written once and placed on the middle tier server to be available throughout the system. With other architectural design, such as 2-tier architecture, a change to a function(service) would need to be written into every application. Therefore, the adoption of 3-tier architecture will make RRS easier to develop.

The 3-tier architecture is more scalable than 2-tier architecture. The 3-tier architecture can accommodate hundreds of users but only 100 users can be accommodated by 2-tier. Therefore, the high scalability of 3-tier really makes sense in the case of RRS where it may access by a large number of users concurrently. In fact, in our ever-changing business environment, scalability and maintainability of a system are the primary concerns.

2.16. APPLICATION PLATFORM

Unix

Unix is an operating system first created by Ken Thompson and Dennis Ritchie at Bell Laboratories in the 1960s. It is an increasingly popular operating system. Unix is currently available on personal computer instead of used on minicomputers and workstations in the academic community traditionally. Moreover, the business community has started to choose Unix for its openness. Unix, like other operating systems, is a layer between the hardware and the application s that that run on the computer. Unix consists of the following three sections :

- Scheduler -- is a special program that allows more than one user to use a computer

system at one time. It shares computer resources among users. Such process is called time-sharing.

- Unix Shell -- is the command interpreter, converts the commands user type in at computer or terminal into the "language" it understands and runs the commands.
- File System -- is a collection of files put into various directories.

Linux

Linux is a **UNIX**-like operating system that was designed to provide personal computer users a free or very low-cost operating system comparable to traditional and usually more expensive UNIX systems. Linux has a reputation as a very efficient and fast-performing system. Linux's kernel the central part of the operating system) was developed by Linus Torvalds at the University of Helsinki in Finland. To complete the operating system, Torvalds and other team members made use of system components developed by members of the Free Software Foundation for the GNU project.

Linux is a remarkably complete operating system, including a graphical user interface, an X Window System, TCP/IP, the Emacs editor, and other components usually found in a comprehensive UNIX system. Although copyrights are held by various creators of Linux's components, Linux is distributed using the Free Software Foundation's copyleft stipulations that mean any modified version that is redistributed must in turn be freely available.

Unlike Windows and other proprietary systems, Linux is publicly open and extendible by contributors. Because it conforms to the Portable Operating System Interface standard user and programming interfaces, developers can write programs that can be ported to other operating systems. Linux comes in versions for all the major microprocessor platforms including the Intel, PowerPC, Sparc, and Alpha platforms. It's also available on IBM's S/390. Linux is distributed commercially by a number of companies.

Linux is sometimes suggested as a possible publicly-developed alternative to the desktop predominance of Microsoft Windows. Although Linux is popular among users already familiar with UNIX, it remains far behind Windows in numbers of users. [whatis.com].

Windows NT

Windows NT is a Microsoft Windows personal computer operating system designed for users and businesses needing advanced capability. NT's technology is the base for the Microsoft successor operating system, Windows 2000. Windows NT (which may originally have stood for "New Technology," although Microsoft doesn't say) is actually two products: Microsoft NT Workstation and Microsoft NT Server. The Workstation is designed for users, especially business users, who need faster performance and a system a little more fail-safe than Windows 95 and Windows 98. The Server is designed for business machines that need to provide services for network-attached computers. The Server is required, together with an Internet server such as Microsoft's Internet Information Server (IIS), for a Windows system that plans to serve Web pages.

Windows NT Workstation: Microsoft says that 32-bit applications will run 20% faster on this system than on Windows 95 (assuming both have 32 megabytes of RAM). Since older 16-bit applications run in a separate address space, one can crash without crashing other applications or the operating system. Security and management features not available on Windows 95 are provided.

Windows NT Server: The NT Server is probably the second most installed network server operating system after Novell's NetWare operating system. Microsoft claims that its NT servers are beginning to replace both NetWare and the various UNIX-based systems such as those of Sun Microsystems and Hewlett-Packard. NT Server 5.0. essentially became what was renamed Windows 2000. [whatis.com]

Advantages :

- improved windows NT diagnostics tool allows for easy examination of the system includes information on device driver information, network usage and system resource's such as IRQ, DMA, and IO address', all presented in a easy-to-view graphical tool.
- System policy editor and user profiles of windows NT allow system administrators to

manage and maintain users' desktops in a consistent manor. System policies are used for the standardization of desktop configurations and control the user work environments and actions.

- The task manager of Windows NT is an integrated tool for monitoring applications and tasks, and reports key performance metrics of the Windows NT system. It provides information on each application and process that are running on the workstation, as well as memory and CPU usage.
- Point-to-point tunneling protocol (PPTP) of Windows NT provides a way to use public data networks, such as the internet, to create a virtual private network, connecting client PCs with servers. PPTP offers protocol encapsulation to support multiple protocol via TCP/IP connections and data encryption.

Windows 2000

Windows 2000 (W2K) is the latest commercial version of Microsoft's evolving Windows operating system. Previously called Windows NT 5.0, Microsoft emphasizes that Windows 2000 is evolutionary and "Built on NT Technology." Windows 2000 is designed to appeal to small business and professional users as well as to the more technical and larger business market for which the NT was designed. For many Windows 95 and Windows 98 users, Windows 2000 may be regarded as a step to take when purchasing their next computer.

The Windows 2000 product line consists of four products:

Windows 2000 Professional, aimed at individuals and businesses of all sizes. It includes security and mobile use enhancements. It is the most economical choice.

Windows 2000 Server, aimed at small-to-medium size businesses. It can function as a Web server and/or a workgroup (or branch office) server. It can be part of a two-way symmetric multiprocessing system. NT 4.0 servers can be upgraded to this server.

Windows 2000 Advanced Server, aimed at being a network operating system server and/or an application server, including those involving large databases. This server

facilitates *clustering* and *load-balancing*. NT 4.0 servers with up to eight-way SMP can upgrade to this product.

Windows 2000 Datacenter Server, designed for large data warehouses, online transaction processing (OLTP), econometric analysis, and other applications requiring high-speed computation and large databases. The Datacenter Server supports up to 16-way SMP and up to 64 gigabytes of physical memory.

Windows 2000 is reported to be more stable (less apt to crash) than Windows 98/NT systems. A significant new feature is Microsoft's Active Directory, which, among other capabilities, enables a company to set up virtual private networks, to encrypt data locally or on the network, and to give users access to shared files in a consistent way from any network computer. [whatis.com]

2.17. WEB SERVER

Internet Information Service 4.0 (IIS)

Internet Information Server 4.0 supports multiple web server scenarios, ranging from simple web sites on an Intranet to large Internet Service Provider (ISP) web hosting farms. It provides a transactional-based web server that is tightly integrated with Windows NT operating system and also a number of components that make it easier to build dynamic web sites, manage content and analyse usage. [24]

Advantages of IIS 4.0

The advantages of IIS can be divided into two categories, which are : -

- The advances in HTTP-related service areas :

  The advancements in the http services area enable IIS to manage multiple web sites, tailor site or application specific setting. The index Server 2.0 that served by IIS 4.0 enables web clients with any browser to search a web site by filling in the fields of an HTML query form.

- The additional functionality in managing and developing application functionality :

  It also provides such advancements for the application development side such as transactional-based applications, process isolations, Secure Sockets layer (SSL)

support, Active Data Object (ADO) and new development tools. For example, the certificate server which is a highly customizable server application for managing the issuance, revocation and renewal of digital certificates can help the organizations to perform authentication on a corporate Intranet or across the Internet.

Benefits provided

- Furthermore, there is a Site Server Express that includes site analysis, usage analysis and publishing capabilities, enables the administrator to analyze log file data, crawl a web site to map content and check for broken links and easily publish content from browser to IIS server.
- IIS provides a high-speed, secure platform for publishing information on internal networks or Internet.
- The server is specifically designed to provide the kind of performance that is necessary for handling an increased number of web users. It is also designed to meet the requirement of the users who are connected with high-speed lines, such as ISDN and leased line.
- The transaction ASP features of IIS also allows application with script add components to perform multiple actions. For example, a failure occurs during a particular transaction, IIS automatically backs up the server to the start of the transaction, allowing the user to recover from failure without any loss of data.

2.18. DATABASE MANAGEMENT SYSTEM

Analysis was done to determine the most appropriate database management system (DBMS) for storing and managing the require data. In order to choose a reliable database, the database must be able to ensure the safety and security of the data. The database is at the core of all mission-critical business applications. Choosing the wrong database can have drastic downstream results.

Selection was based on the consideration for usability and effectiveness in the context of cross platform deploying, storage space required and the portability of the records.

Microsoft Access 2000

One of the easiest ways of creating a database is by using Microsoft Access. This is because it has an easy menu driven interface that lets the user issue commands without an in depth understandings of Access. At its most basic level, Access can be used to develop simple personal Database Management System.

Access is an excellent platform for developing an application that will run a small business. Its wizards allow developers to quickly and easily build the foundation of application. The ability to build code modules allow developers to create code libraries of reusable functions and the ability to add code behind forms and reports allow them to create powerful custom forms and reports. (Balter, 1996)

Microsoft SQL Server 2000

SQL Server is an ideal database engine for powering web sites. Through tight integration with Internet Information Server, SQL Server can be queried and update via popular Web browser. SQL Server's native ODBC lets it inter-operate smoothly with the Internet Database Connector interface included with Internet Information Server.

Microsoft SQL Server maintains referential integrity and security, and ensures that operation can be recovered in the event of numerous types of failure. SQL Server can control the access for the type of info that can be retrieved by the user.

SQL Server support internet database integration. It allows the user to automate the publishing of database information in HTML documents. It allows us to build active web sites and let us conduct processes on the internet. When combining with IIS and the SQL Server Internet Connector, it gives user the complete internet database publishing capabilities.

Oracle

Oracle is the first software company to develop and deploy 100 percent internet – enabled enterprise software across its entire product line : database, server, enterprise business application, application development and decision support tools.

Oracle is the most – used relational database in the world. Because of Oracle's popularity, most database applications that are sold are built to work with Oracle, no matter which other databases they support. Nearly all "enterprise class" software has Oracle support built in, and Oracle has as good a reputation for scalability and stability as anyone in the database market.

Each distinct Oracle database referred to as an *instance*. The instance is the actual server process running on a computer. Each instances can support multiple users, schemas, and even databases. Applications generally communicate with an Oracle database using SQL*NET, a product that allows two computers running Oracle software to communicate with one another.

One of Oracle's main advantages is that its database runs on many platforms, and more importantly, the platform on which the databases is running is transparent to applications that communicate with the database server. Oracle takes care of all the data storage issue and also communicates with applications using standard protocols over a network. As long as the underlying operating system supports the appropriate protocol, Oracle is able to use it to communicate with applications running on other servers.

However, the bottom line of Oracle is that it is extremely expensive – at least in comparison to moderately priced products such as Microsoft SQL Server. Oracle also utilizes a Byzantine pricing structure along the lines of those that most enterprise application vendors have adopted, so it is impossible to discuss how much Oracle will cost.

2.19. MICROSOFT DATA ACCESSS TECHNOLOGY

There are many types of Microsoft's Data Access Technologies. There are VB SQL, Open Database Connectivity (ODBC), Data Access Object, Remote Data Object (RDO), AvtixeX Data Object (ADO) and OLE-DB.

OLE DB

OLE DB is Microsoft's strategic low-level application program interface for access to different data sources. OLE DB is a set of interfaces that are designed to provide data access to *all* data, regardless of type, format or location. It effectively "componentizes"

database and related data processing functionality, breaking it up into interoperable components that can run as middleware on the client or server across a wide variety of applications. The OLE DB architecture provides for components such as direct data access interfaces, query engines, cursor engines, optimizers, business rules and transaction managers.

OLE DB includes not only the Structured Query Language capabilities of the Microsoft-sponsored standard data interface Open Database Connectivity (ODBC) but also includes access to data other than SQL data.

As a design from Microsoft's Component Object Model , OLE DB is a set of method(in earlier days, these might have been called *routines*) for reading and writing data. The object in OLE DB consist mainly of a data source object, a session object, a command object, and a rowset object. An application using OLE DB would use this request sequence:

1 Initialize OLE

2 Connect to a data source

3 Issue a command

4 Process the results

5 Release the data source object and uninitialize OLE

OLE once stood for "Object Link Embedding and "DB" for database. However, Microsoft no longer ascribe these meanings to the letters "OLE" and "DB".

Open Database Connectivity (ODBC)

ODBC is a method that used by visual basic to communicate with client/server databases. ODBC is a Windows technology that lets a database client application connect to a remote database. Residing on client-side computers, ODBC seeks to make every relational data source generic from the viewpoint of the client application.

ODBC is composed of three parts :

- A driver manager
- One or more drivers
- One or more data sources

It is a component of Microsoft's Windows Open System Architecture (WOSA). It provides a set of application program interface (API) functions, which makes it easier for developers to connect to a wide range of database formats that is it supports SQL. Developers can access a number of PC databases using ODBC. ODBC is based on the X/Open Call-Level Interface and uses SQL. During the run time, ODBC driver will communicate with other drivers and through a standard interface called Service Provider Interface (SPI). It is a network independent technology because it employs replaceable network libraries.

However, the biggest downside to ODBC is that it must be able to support the capability to translate calls. This means that additional processing overhead can slow the data access bit.

ODBC And Its Relationship To OLE DB

So what is the relationship between ODBC and OLE DB? ODBC has become the *de facto* standard for standards-based client/server database access. ODBC provides a standards-based interface that requires SQL processing capabilities and is, in fact, optimized for that SQL-based approach. Literally millions of applications, from business intelligence packages to custom developed transactional applications rely on ODBC for standards-based access.

OLE DB builds upon the success of ODBC, but extends it to a component architecture that delivers higher level data-access interfaces, providing consistent access to SQL, non-SQL and eventually unstructured data sources across the enterprise and the Internet. In fact, for access to SQL-based data, OLE DB still uses ODBC, as it is the most optimized architecture for that area.

In addition, MERANT provides lightweight bridge technology that allows existing ODBC applications to use OLE DB Providers. This fundamental interoperability architecture allows both existing ODBC applications to access data from previously unavailable data via OLE DB *and* new OLE DB applications to access existing ODBC data, accelerating time to market and preserving existing investments.

2.20. DATA ACCESS OBJECT LIBRARIES

ActiveX Data Object (ADO)

ActiveX Data Object (ADO) is introduced as the primary means of building data-driven Web applications. Since then, ADO has become the standard API developers use to work with databases for applications built with Microsoft tools and technologies.

The ADO objects provide you with the fastest, easiest and most productive means for accessing all kinds of data sources. The ADO model strives to expose everything that the underlying data provider can do, while still adding value by giving you shortcuts for common operations.

ADO is Microsoft's strategic, high-level interface to all kinds of data. ADO provides consistent, high-performance access to data, whether you're creating a front-end database client or middle-tier business object using an application, tool, language, or even an Internet browser. ADO is the single data interface you need to know for 1- to n-tier client/server and Web-based data-driven solution development.

ADO is designed as an easy-to-use application level interface to Microsoft's newest and most powerful data access paradigm, OLE DB. OLE DB provides high-performance access to any data source, including relational and non-relational databases, email and file systems, text and graphics, custom business objects, and more. ADO is implemented with a small footprint, minimal network traffic in key Internet scenarios, and a minimal number of layers between the front-end and data source-all to provide a lightweight, high-performance interface. ADO is easy to use because it is called using a familiar metaphor - the OLE Automation interface, available from just about any tool and language on the market today. And since ADO was designed to combine the best features of, and eventually replace Remote Data Objects (RDO) and Data Access Objects (DAO), it uses similar conventions with simplified semantics to make it easy to learn for today's developers.

3.1 WEB LANGUAGES AND TECHNOLOGIES

Hyper Text Markup Language (HTML)

HTML is a layout language. It contains commands that, like a word processor, tell the computer— in a very loose sense—what the content of the document is. Using HTML ,

we can tell the computer that a certain document contains a paragraph, a bulleted list, a table, or an image. The HTML rendering engine is responsible for displaying the text and images on the screen. The difference between HTML and word processor is that word processors work with proprietary formats, therefore one word processor cannot directly read another word processor's file format—they usually need a special program, called an import/export filter, to translate one file format to another. [30]

In contrast, HTML is an open, worldwide standard. If you create a file using the commands available in version 3.2 or earlier, it will display on almost any computer with any operating system—anywhere in the world.

Why HTML is important

- Until HTML, it wan not so easy to create screens full of information that anyone could read. The only way to display information is to write a program or using a presentation like PowerPoint. In this way, the constraint occurs when the output is only available to people using the same operating system and the same program—usually those with the same version of the program.
- It provides millions of people with access to information online that they could not or would not have seen any other way.
- HTML is the first easy method for non-programmers to display text and images on-screen without limiting the audience to those who own or have access to the same program (or a viewer) that the author used to create the content.
- In addition, browsers are universal content viewers and HTML is the universal file format which help universalizing the display of any output of information.

The limitations of HTML

Despite HTML's popularity, availability and the fact that it is a universal file format, HTML has several considered serious limitations as a way to create structured documents, as a layout language, and as a file format.

- Plain HTML has no way to specify the exact position of content on a page, either horizontally, vertically, or along the z-axis, which controls the layers in which objects appear.

- HTML is not a programming language, thus it has no decision-making capabilities.
- HTML is a fixed language. Therefore, the limited command set forces developers to build proprietary extensions to perform more advanced functions.

Common Gateway Interface (CGI)

- Gateway is a software program used to connect networks using different protocols so that they transfer data between the two. Before transferring, the program converts the data into a protocol-compatible form.
- CGI is a standard for managing the interface between Web servers and the server software. It converts data from the Internet format into the format used by the operating system, e.g., UNIX or Windows.
- CGI scripts are programs which are capable to manipulate text and communicate with other software. Usually these are written in C, C++, Java, and most frequently, in Perl.
- The shortcomings of CGI: (1) CGI overhead slows down processing; (2) the appropriate languages are difficult to learn.

Active Server Pages 3.0

ASP is a server-side technology, which also means that it is processed on the web server to generate HTML, while pure HTML is processed solely on the browser. It is definitely undeniable that applying server-side language has many advantages, which can hardly be found in most client-side languages. [7]

ASP is found more effective in comparison with CGI and other programming languages. Besides, there is no additional software required for this approach. VBScript that plays the role of ASP default scripting language is fast and portable interpretation.

ASP has several major advantages over most other Web application development languages or environments, especially for internet development.

Why ASP?

Below are the tremendous advantages of ASP itself :

- ASP code resides in text files that are known to be easy to modify, even after deployment. Thus, it makes capable for developers to fix a problem remotely just by using a text editor.[31]
- ASP code is server-safe. This is due to the fact that ASP code runs only in a limited space, which means that you cannot natively read or write binary files with ASP.
- ASP code times out. IIS (Internet Information Server) stops executing ASP pages after 90 seconds by default. Therefore, if you accidentally write an endless loop, you won't tie up the server beyond the timeout interval.
- ASP applications are usually small because all the DLLs are already installed on the server, you need only deliver the code files, images and support files to make an ASP application runs. [7]

The advantages of ASP over HTML

HTML is a simple and flexible formatting and layout language, but it has no programming constructs. In another words, if it is to display static text and images, HTML is simply perfect. But if it is to display content that changes often, or if you need to display content tailored for individuals, HTML is lacking. This is because HTML lacks any decision-making capability. [16]

Java Server Page (JSP)

Java Server Pages is simply an HTML web page that contains additional bits of code that execute application logic to generate dynamic content. This application logic may involve Java Bean, JDBC objects, Enterprise Java Bean (EJB), and emote Method Invocation (RMI) objects, all of which can be easily accessed from a JSP page. For instance, a JSP page may contain HTML cod that displays static text and graphics, as well as method call to a JDBC object that accesses a database. When the page is displayed in a user-s browser, it will contain both the static HTML content, and the dynamic information retrieved from the database.

Java Server Pages technology allows web developers to easily develop and maintain dynamic web pages that leverage existing business systems. As apart of the Java technology family, JSP enables rapid development of web-based application that are

platform-independent. JSP separates user interface from content generation, enabling designers to change the overall page layout without altering the underlying dynamic content. Therefore, it allows developers to create flexible code that can easily be updated and reused. Due to the fact that JSP pages are automatically compiled as needed, web authors can make changes to presentation code without recompiling application logic. This makes JSP a more flexible method of generating dynamic web content than Java servlets.

Why ASP Instead of JSP?

Although JSP seems to have abundant of advantages over many other web languages, it still does not make its best solution for the Java platform. Certain parts of the JSP weaknesses has been revealed and analysed as follow.

- Need a compiler

  JSP requires a java compiler. The problem with the Java compiler is that it generally not cross-platform and are not much help to a pure-Java web server. However, JSP itself has a pre-compile option that can help to solve the problem, although it is still not a powerful solution.

- Java code is too tempting

  JSP makes it tempting to put Java code in the web page, even though it is considered a bad design. Just as Java improves on C++ by removing the ability to use global variables and multiple inheritance, so do template engines improve on JSP removing the ability to put raw code in the page.

- Lousy looping

  Looping in JSP is difficult.

- Even simple tasks are hard

  Doing even a quite simple task such as header and footer includes are difficult.

- Wasted space

  JSP consumes extra hard drive space and extra memory space. For every 50K JSP file on the server, there requires a corresponding larger than 50K class file to be created. This essentially doubles the hard drive requirements to store JSP pages.

In addition, each JSP class file data must be loaded into the server's memory, meaning the server may eventually store the entire JSP document tree in memory.

- Useless error messages

  JSP syntax errors can cause odd and useless error messages. his is due to the fact that the page is transformed into a servlets and then compiled. Good JSP tool can help narrow down errors to likely syntax error locations, but even the best tool will probably have problems making all error messages meaningful.

  Some errors will just be impossible for tools to diagnose, due to the transformation. [23]

2.21. WEB APPLICATION DEVELOPMENT TOOL

Microsoft Visual InterDev 6.0

Microsoft Visual Interdev 6.0 empowers web applications developers to rapidly build fully interactive, dynamic web sites. It is actually categorized into components, the client-side and server-side components.[19]

The client component is further separated into 4 modules : the Visual Interdev Client, the Image Composer, the Music Producer and the Media Manager. The Visual Interdev IDE is the actual development environment used to create ASP and it also includes the HTML Layout editor which assist in placing and layering Active controls. The Image Composer, Music Producer and Media Manager are utilities that help to create multimedia aspects to integrate with web sites.

The serve-side components consist of the Personal Web Server, ASP and FrontPage extension. The Personal Web Server enables developers to install an HTTP server on any Windows 95 machine that gives the ability to create and test ASP on any machine without having to rely on installing the NT server. The ASP component installs the Active Server engine that is responsible for processing Active Server scripts on the HTTP server. The FrontPage extensions are used to establish the communication link between the requesting client development tools and the web server.

Visual Interdev fully support both client and server side scripting. This means that you can write programs that run either on the server or on the user's web browser. For scripting languages, it supports both VBScript and Jscript (JavaScript).

The Visual Interdev extensions add to the FrontPage extensions the capabilities to support ASP. With ASP, you can write scripts that execute on the server and directly reference Active X server components, such as connecting to database via ADO.

Benefits of Microsoft Visual InterDev 6.0

- It is a rapid end-to-end web application development tool. It allows professional developers to design, build, debug and deploy cross-platform HTML and Script based web application faster than ever before.
- It is powerful and integrated database tools. It includes a complete set of database programming and design tools, allowing developers to build enterprise-class, data-driven web application within a single, integrated IDE.
- It is full-featured, standard-based team developers specifically designed to meet the unique challenges of team-based web development. [25]

CHAPTER 3 METHODOLOGY AND SYSTEM ANALYSIS

3.1 SYSTEM DEVELOPMENT METHODOLOGY

Project Development Life Cycle

In order to develop a system in an organized and effective way, it is necessary to follow a sequence of steps to accomplish a complete set of tasks, which is generally called a process. A process is referred to a series of steps involving activities, constraints, and resources that help us produce our intended output. Thus, it usually includes a set of tools and techniques. When the process involves the building of certain kind of product, it is referred as a life cycle. Therefore, the development process of SFA system is defined as the Project Development Life Cycle, because it describes the life of the SFA system (which is the output product) from its conception to its implementation, use and maintenance.

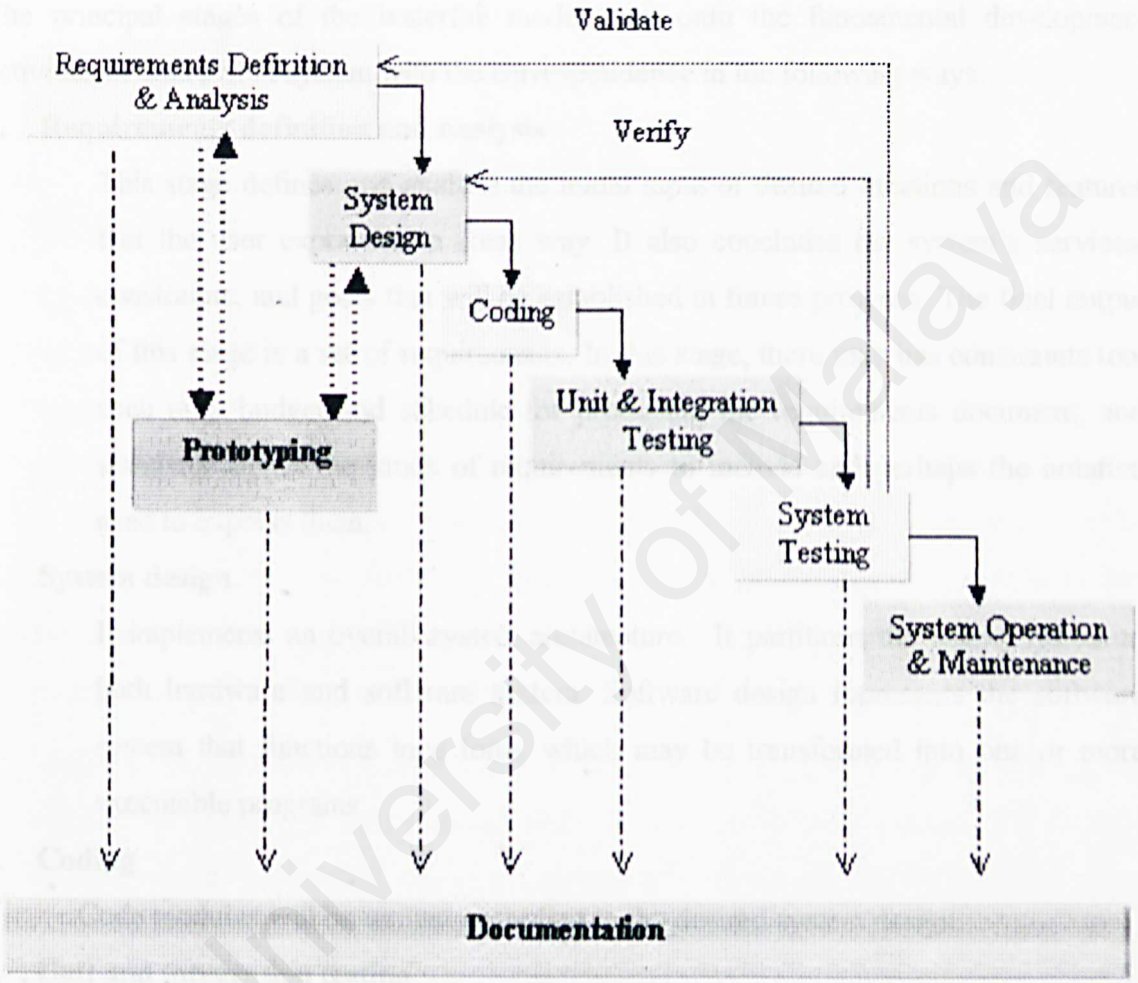
Waterfall Model With Prototyping

After having analysis on both common models, which are the Waterfall Model and Prototyping Model, a combination of the Waterfall and Prototyping models has been identified as the methodology to be applied for the SFA system application development.

As mentioned in previous chapter of literature review, waterfall model is defined as a model of processes where the stages are depicted as cascading from one to another. Thus when all the requirements are identified, analyzed for completeness and consistency, and documented in a requirements documents, then the development team can proceed to system design and so on.

Whereas prototyping is a sub process that can help enhancing understanding of the developing system. Prototype itself is referred to a partially developed output (product) of the system that enables the developers to examine some aspect of the proposed system and decide if it is suitable or appropriate for the finished output. Therefore, it is a need to include the prototyping stage into the waterfall model.

Fig3.1 : Waterfall Model with Prototyping



Correspondence of proposed methodology with system

The overall development is broken into distinct stages much like the waterfall model, with the exception that prototypes are included into the two initial stages of the SFA system application development modules to enhance understanding.

Waterfall Model with prototyping is chosen based on the nature of my project, which demands a systematic and sequential approach to software development that begins at the

requirements analysis stage and progress through system design, coding, unit and integration testing, system testing and lastly the system operation and maintenance .

Simultaneously, the documentation process will occupy throughout the whole development of the SFA system as well. This is an additional stage to the original Waterfall Model with prototyping.

The principal stages of the waterfall model map onto the fundamental development activities of entire SFA system with the correspondence in the following ways:

1. **Requirements definition and analysis**

   This stage defines and analyze the initial input of desired functions and features that the user expresses in some way. It also concludes the system's services, constraints, and goals that will be established in future progress. The final output of this stage is a set of requirements. In this stage, there may has constraints too, such as a budget and schedule for producing the requirements document, and standards about the kinds of requirements to include and perhaps the notation used to express them.

2. **System design**

   It implements an overall system architecture. It partitions the whole system to both hardware and software system. Software design represents the software system that functions in a form, which may be transformed into one or more executable programs.

3. **Coding**

   Code modules will be written according to the desired system design.

4. **Unit and integration testing**

   Each of the unit done will be tested separately. Once each of the individual unit module has been sufficiently developed to a reasonable stage of completeness, they are brought together for the final integration into the complete SFA system application, unifying the separate parts and forming a coherent system. The integration will be tested as well to ensure that every single unit can be integrated well and is ready to fit into the final system to be run and tested in the following proceeding.

5. **System testing**

   Final testing is then conducted on the SFA application as a whole.

6. **Operation and maintenance**

   The system being tested is installed and put into practical implementation. Maintenance involves correcting errors that were not discovered in earlier stages of the life cycle. This is to improve the implementation of the system units and enhancing the system's services as new requirements are found.

Prototyping

As an efficient developer, it is always a need to conduct prototyping in the initial stage of the development life cycle, especially applying it concurrently with the requirements analysis & definition stage, and also the system design stage. This is an essential part of the project methodology since the partially developed output will be examined to assure the feasibility and consistency of the previously defined key requirements. If it fails to do so, revisions is better to be made at the requirements stage, rather than at the more costly testing stage.

Similarly, parts of the system design may be prototyped as well. Design prototyping will help to assess alternative design strategies and decide which is best for the SFA System project. Meanwhile, the user interface of SFA system will be built and tested as a prototype to increase the understanding of what and how the expected new system will be like.

- ***Validation***

Validation ensures that the SFA system has implemented all of the requirements, so that each system function can be traced back to a particular requirement until the specification in future.

- Verification

Verification assures that each functions in SFA system development progress works correctly. That is, validation make sure that the right system is being built, whereas verification checks the quality of the implementation.

Justification of proposed methodology

Waterfall Model with Prototyping is chosen based on its several convincing reasons that supports and routing throughout the whole developing progress of SFA system. There are totally 6 main stages that are clearly defined for the entire project development life cycle. These are the convincing points and strength in applying the proposed methodology into my SFA system development:

- *Theoretically, one development stage should be completed before the next begins. In overall, this proposed methodology presents a very high-level view of what goes on during development, and it suggests me the sequence of events that I expect to encounter.*

However, in practice, these stages overlap among on and another, and feed information to each other. For instance, during design stage, problems with requirements definition would be identified; during coding stage, problems related to system design would be encountered. Therefore, it is more suitable to say that an application system development process is not a simple linear model but involves a sequence of repetition of the activities.

- *Associated with each process activity will be milestone and deliverables, so that I can use the model to estimate how close the project is to completion at a given point in time.*

- *In addition, this model is expected to help me lay out what the system needs to do in an order way. Its straightforwardness and simplicity make it easy to explain to others who are maybe not very familiar with the SFA system development.*
- *Prototyping conducted concurrently with the requirements analysis & definition stage in the initial stage of the development life cycle, effectively helps in ensuring the developing system time to time that it always meets its definition of needs and is feasible enough. If any error or inappropriate concept and definition found during the early stage, correction and improvement will take place immediately. It is therefore able to avoid or at least reduce cost of changing the whole testing stage when everything almost comes to the final stage.*
- *Documentation that is applying throughout the whole life cycle ensure each activity of the model ends with the production of some documentations. This is an essential step since the documents will make the developing progress more visible.*

3.2 COLLECT INFORMATION TECHNIQUE

In developing a system a lot of information is needed. As for my project, information will be gathered through the methods as below:

- Surf net
- Get it from related books
- Refer to web based program

3.3 REQUIREMENT SPECIFICATIONS

The requirement of the SFA system can be divided into two categories: functional requirements and non-functional requirements. Functional requirement describe how the

SFA system interact with its operating environment. On the other hand, non-functional requirements are the limitations placed on the system that narrow the choices that can be made for the implementation.

Functional Requirements

A functional requirement describes an interaction between the system and its environment. Further, functional requirements also describe how the system should behave given certain stimuli. The important thing is the questions addressed by functional requirements have answers that are independent of an implementation of a solution to a problem. The functional requirement in this project is the sales representatives Area Planning module and the Administration module.

Description about the modules in SFA System

As mentioned in Chapter 1, SFA System is divided into two major modules, which include sales representatives Area Planning module and Administration module. Each module consists of a few components and each components has its own features as described below:

1. **Sales representatives Area Planning module**

   Area Planning module is the working area for sales representatives. The functionalities in this module enable the system to log and track the representatives' activities. Basically, a sales representative's duties involved meeting customers, promoting products to them and if required give them samples. A good sales management system will provide representatives with sales quota and 'call' quota. Call quota is the minimum number of visits that the sales representative has to make to different customers. This gives them a direction and impetus to drive themselves.

   Hence the call report is there to enable the sales representatives to log down their visits so that their call quota is recognized. For a higher level, managers can track

the activities of their staff and use this information to correlate the effectiveness of their visits.

During times when sales representatives are not making calls, they will have to input their other activities into the Non-Call report. This is to explain for the usage of their time if their call quota is not reached. Taking this information into account, we can then make more meaningful analysis on their 'actual' productivity.

As mentioned earlier on, we need to make information readily available to everyone. This is achieved by using an integrated database that stores information on customers, companies, products and sales. The system provides the sales representatives with information that is only relevant to them so that they do not have to search through a mountain of information for some simple data. This method improves speed, user friendliness and also it protects corporate data to some extent.

- Call Report

  Call report is an avenue for sales representatives to key in their visits to customers. During this visit, they can either promote products, give samples or maybe close a sales. These actions can be entered in the Call report entry form.

- Non-call Report

  Non-call report is an avenue for sales representatives to key in their activities other than visits to customers. For an example, training, conferences or illness. This is to ensure that their superiors are aware of this and do not penalize them for not reaching the call quota on that particular day.

- Sample Movement

  This sample movement is not meant to be a full-fledged inventory system with warehouses, stock takes and delivery agents. However, it does provide basic inventory functionalities like quantity control and lot number tracking. In this environment, the sales representatives act as repositories of samples, similar to warehouse.

- Customer Information

  Customer information is a part of the corporate CRM knowledge base. The customer database stores personal and professional information. It helps the sales representatives in their approach with customer.

- Company Information

  It stores details of the companies that a customer works for.

- Product Information

  It stores details of the products to be sold.

2. Administration module

It has the similar components to sales representatives Area Planning module. However it has extra functions. The administrator can add, edit and delete system user and product to be sold.

Non-Functional Requirements

A non-functional or constraint describes a restriction the system that limits our choices for constructing a solution to the problem. These requirements are very subjective but are as important as the functional requirements. Non-functional requirements for this project is described as below:

- User friendly

  Users are allowed to use this system without any computer knowledge.

- Fast retrieval of information

  Users should be able to retrieve the information needed within reasonable time.

- Reliability

  The entire system must to the user as a consistency and an accuracy system. Problems and system failures will be prevented and minimized to enable the system to be a reliable system. The system will stable and consistent in all environments.

- Efficiency

  This system will ensure efficiencies, in system execution and data storage. The simplicity of the system will enable the new user familiar with the system in a short time. This system will also enable the users handle their jobs efficiently by reducing time, manpower and other resources.

- Flexibility

  As the project's implementation is based on SFA System technologies, it is foreseeable that newer technologies that can work with existing web-based technologies will have no problem integrating in this system.

- Maintainability and Expandability

  Maintainability may be defined quantitatively as the ease with which software can be understood, corrected, adapted and enhanced. Maintainability is the degree to which architectural data or procedural design can be extended. SFA System is design to be expandable in the future.

- Security

  The security features built in prevents unauthorized access into the full-text of the SFA, user must log in with correct user name and ID in order to access the full text of the SFA.

3.4 ANALYSIS OF TECHNOLOGICAL REQUIREMENTS

Application Platform

I will choose Windows 2000 as the application platform to develop my project due to the reasons stated below:

- Windows 2000 is reported to be more stable than Windows 98 and NT
- Windows 2000 is a true multipurpose server operating system.
- It is considered the most easiest server operating system available.
- It is also one of the powerful operating system that integrates a variety of network services.
- The services it provides are designed to address requirements in every category and they are managed in a single way.

- There is a core set of services providing the platform not only for basic management features built into the operating system but also for value-added tools and solutions form Microsoft and third parties.
- Windows 2000 is a platform complete enough for building and hosting web based applications. It is the best platform to publish and share information securely over Intranet and Internet
- There is an extensive security support in Windows 2000. The comprehensive and usable security enables Windows 2000 to offer the most robust security model, which can control the access control of user in accessing certain file or application. The centralized Windows 2000 security subsystem uses advanced security design features that provide an exceptional level of system security. A password filter allows system administrators to increase password strength and the encrypting password data using a 128-bit cryptographically random key also increase the protection of account password information stored in the registry by the Security Account Manager (SAM).

Web Server

Internet Information Service 4.0 (IIS)

Internet Information Server 4.0 supports multiple web server scenarios, ranging from simple web sites on an Intranet to large Internet Service Provider (ISP) web hosting farms. It provides a transactional-based web server that is tightly integrated with Windows NT operating system and also a number of components that make it easier to build dynamic web sites, manage content and analyse usage. [24]

The advantages of IIS can be divided into two categories, which are : -

- The advances in HTTP-related service areas :

  The advancements in the http services area enable IIS to manage multiple web sites, tailor site or application specific setting. The index Server 2.0 that served by IIS 4.0 enables web clients with any browser to search a web site by filling in the fields of an HTML query form.

- The additional functionality in managing and developing application functionality :

  It also provides such advancements for the application development side such as transactional-based applications, process isolations, Secure Sockets layer (SSL)

support, Active Data Object (ADO) and new development tools. For example, the certificate server which is a highly customizable server application for managing the issuance, revocation and renewal of digital certificates can help the organizations to perform authentication on a corporate Intranet or across the Internet.

Benefits provided

- Furthermore, there is a Site Server Express that includes site analysis, usage analysis and publishing capabilities, enables the administrator to analyze log file data, crawl a web site to map content and check for broken links and easily publish content from browser to IIS server.
- IIS provides a high-speed, secure platform for publishing information on internal networks or Internet.
- The server is specifically designed to provide the kind of performance that is necessary for handling an increased number of web users. It is also designed to meet the requirement of the users who are connected with high-speed lines, such as ISDN and leased line.
- The transaction ASP features of IIS also allows application with script add components to perform multiple actions. For example, a failure occurs during a particular transaction, IIS automatically backs up the server to the start of the transaction, allowing the user to recover from failure without any loss of data.

Database Management System

Microsoft Access 2000

One of the easiest ways of creating a database is by using Microsoft Access. This is because it has an easy menu driven interface that lets the user issue commands without an in depth understandings of Access. At its most basic level, Access can be used to develop simple personal Database Management System.

Access is an excellent platform for developing an application that will run a small business. Its wizards allow developers to quickly and easily build the foundation of application. The ability to build code modules allow developers to create code libraries of

reusable functions and the ability to add code behind forms and reports allow them to create powerful custom forms and reports. (Balter, 1996)

Web Languages & Technologies

Hyper Text Markup Language (HTML)

HTML is a layout language. It contains commands that, like a word processor, tell the computer— in a very loose sense—what the content of the document is. Using HTML , we can tell the computer that a certain document contains a paragraph, a bulleted list, a table, or an image. The HTML rendering engine is responsible for displaying the text and images on the screen. The difference between HTML and word processor is that word processors work with proprietary formats, therefore one word processor cannot directly read another word processor's file format—they usually need a special program, called an import/export filter, to translate one file format to another. [30]

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- It provides millions of people with access to information online that they could not or would not have seen any other way.
- HTML is the first easy method for non-programmers to display text and images on-screen without limiting the audience to those who own or have access to the same program (or a viewer) that the author used to create the content.
- In addition, browsers are universal content viewers and HTML is the universal file format which help universalizing the display of any output of information.

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ASP has several major advantages over most other Web application development languages or environments, especially for internet development.

Why ASP?

Below are the tremendous advantages of ASP itself, which I have drawn:

- ASP code resides in text files that are known to be easy to modify, even after deployment. Thus, it makes capable for developers to fix a problem remotely just by using a text editor.[31]
- ASP code is server-safe. This is due to the fact that ASP code runs only in a limited space, which means that you cannot natively read or write binary files with ASP.
- ASP code times out. IIS (Internet Information Server) stops executing ASP pages after 90 seconds by default. Therefore, if you accidentally write an endless loop, you won't tie up the server beyond the timeout interval.
- ASP applications are usually small because all the DLLs are already installed on the server, you need only deliver the code files, images and support files to make an ASP application runs. [7]

The advantages of ASP over HTML

HTML is a simple and flexible formatting and layout language, but it has no programming constructs. In another words, if it is to display static text and images, HTML is simply perfect. But if it is to display content that changes often, or if you need to display content tailored for individuals, HTML is lacking. This is because HTML lacks any decision-making capability. [16]

Web Application Development Tool

Microsoft Visual InterDev 6.0

Microsoft Visual Interdev 6.0 empowers web applications developers to rapidly build fully interactive, dynamic web sites. It is actually categorized into components, the client-side and server-side components.[19]

The client component is further separated into 4 modules : the Visual Interdev Client, the Image Composer, the Music Producer and the Media Manager. The Visual Interdev IDE is the actual development environment used to create ASP and it also includes the HTML Layout editor which assist in placing and layering Active controls. The Image Composer, Music Producer and Media Manager are utilities that help to create multimedia aspects to integrate with web sites.

The serve-side components consist of the Personal Web Server, ASP and FrontPage extension. The Personal Web Server enables developers to install an HTTP server on any Windows 95 machine that gives the ability to create and test ASP on any machine without having to rely on installing the NT server. The ASP component installs the Active Server engine that is responsible for processing Active Server scripts on the HTTP server. The FrontPage extensions are used to establish the communication link between the requesting client development tools and the web server.

Visual Interdev fully support both client and server side scripting. This means that you can write programs that run either on the server or on the user's web browser. For scripting languages, it supports both VBScript and Jscript (JavaScript).

The Visual Interdev extensions add to the FrontPage extensions the capabilities to support ASP. With ASP, you can write scripts that execute on the server and directly reference Active X server components, such as connecting to database via ADO.

Benefits of Microsoft Visual InterDev 6.0

- It is a rapid end-to-end web application development tool. It allows professional developers to design, build, debug and deploy cross-platform HTML and Script based web application faster than ever before.

- It is powerful and integrated database tools. It includes a complete set of database programming and design tools, allowing developers to build enterprise-class, data-driven web application within a single, integrated IDE.
- It is full-featured, standard-based team developers specifically designed to meet the unique challenges of team-based web development. [25]

System Requirements

Environment For Development Phase

Hardware Requirements

The recommended hardware requirements for the development environment are listed as the following :

- A server with at least Pentium 133 MHz processor
- At least 32 MB RAM of memory
- At least 2 GB of hard disk space
- A SVGA Graphic Adapter
- Network Interface Card (NIC) and network connection with recommended bandwidth at 10 Mbps or more

Software Requirements

The recommended software requirements for the development environment are listed as the following :

- Microsoft Windows NT Server 4.0 or above
- Internet Information Server 4.0 (IIS)
- Active Server Page (ASP)
- Microsoft Visual InterDev 6.0
- Microsoft SQL Server 7.0
- Microsoft Internet Explorer 4.0 or above

Environment For Runtime Phase

Hardware Requirements

The recommended hardware requirements for the development environment are listed as the following :

- At least Pentium 133 MHz processor
- At least 16 MB RAM of memory
- At least 1 GB of hard disk space
- A SVGA Graphic Adapter
- Network Interface Card (NIC) and network connection with recommended bandwidth at 10 Mbps or more

Software Requirements

The recommended software requirements for the development environment are listed as the following :

- Microsoft Windows 95/98 or Windows NT 4.0
- Internet Explorer 4.0 or above

3.5 SUMMARY

This requirement specification and analysis part give more precise description of the functionality and the constraints on the system after the feasibility studies on the overall available technologies. It is an important phase to ensure that the project will meet the real requirement of the project and to reduce the misunderstanding and misinterpretation of the whole system.

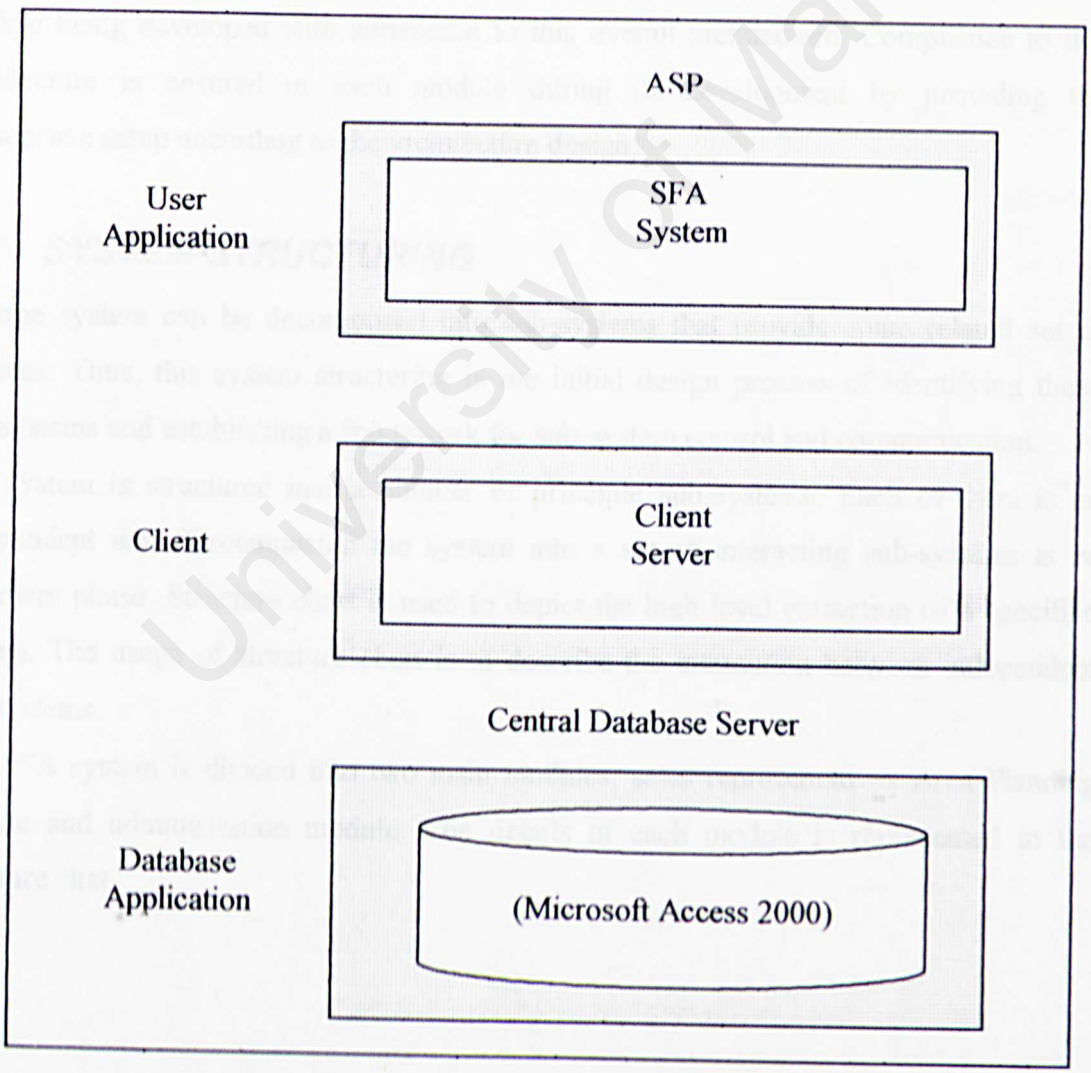
CHAPTER 4 SYSTEM DESIGN

4.1 SYSTEM ARCHITECTURE

The SFA System is designed to leverage the traditional client / server architecture. It is divided into three sections: user application, client and database application. All the components were built into each tiers to fulfill its role and then tied together to form a final solution.

The following diagram depicts the overall SFA System:

Fig4.11 : SFA System Architecture



For the user application (SFA System), all the input and output will be processed by using ASP. So ASP would be used to display all the data in this level. In this level there have certain components to gather input variables or query for analysis. There is also a component to display the results of the analysis to the difference system users.

For the client part, there is a process, which perform the analysis. This tier resides on the store back office. All data in this level can be added, edited, and deleted by interacting with the database.

For the database application, a repository of relevant data is stored in the Access 2000. It is available to support the work performed the analysis engine. While, all the file systems will be coordinated by the Central Database Server.

The final integration of the separately developed modules depends heavily on each module being developed with adherence to this overall architecture. Compliance to this architecture is ensured in each module during its development by providing the appropriate setup according to the architecture design.

4.2 SYSTEM STRUCTURING

A large system can be decomposed into sub-systems that provide some related set of services. Thus, this system structuring is the initial design process of identifying these sub-systems and establishing a framework for sub-system control and communication.

The system is structured into a number of principle sub-systems. Each of them is an independent unit. Decomposing the system into a set of interacting sub-systems is an important phase. Structure chart is used to depict the high level extraction of a specified system. The usage of structure chart is to describe the interaction between independent sub-systems.

The SFA system is divided into two main modules: sales representatives Area Planning module and administration module. The details of each module is represented in the structure chat.

Fig4.12 : Structure of the SFA System

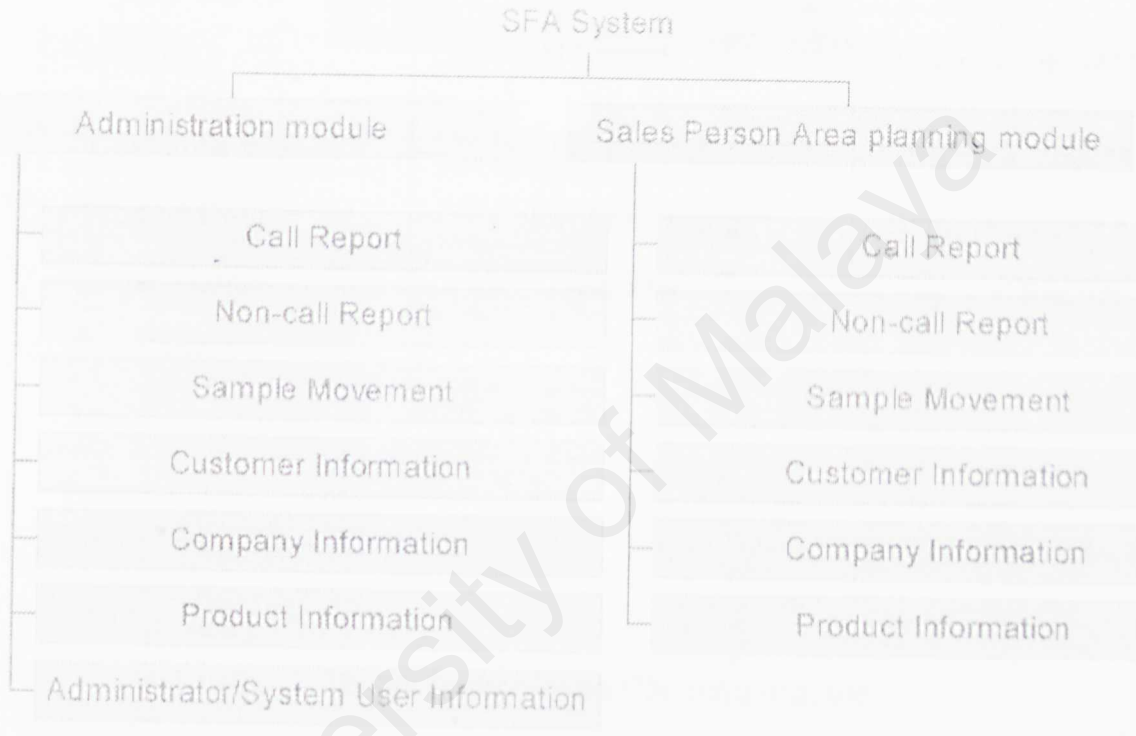
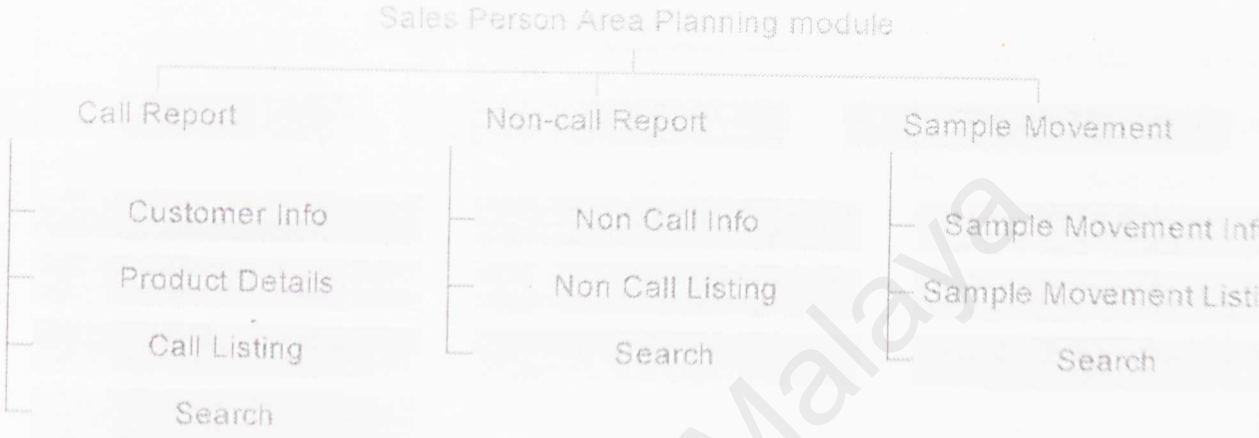


Fig4.13 : Structure of Sales Person Area Planning module



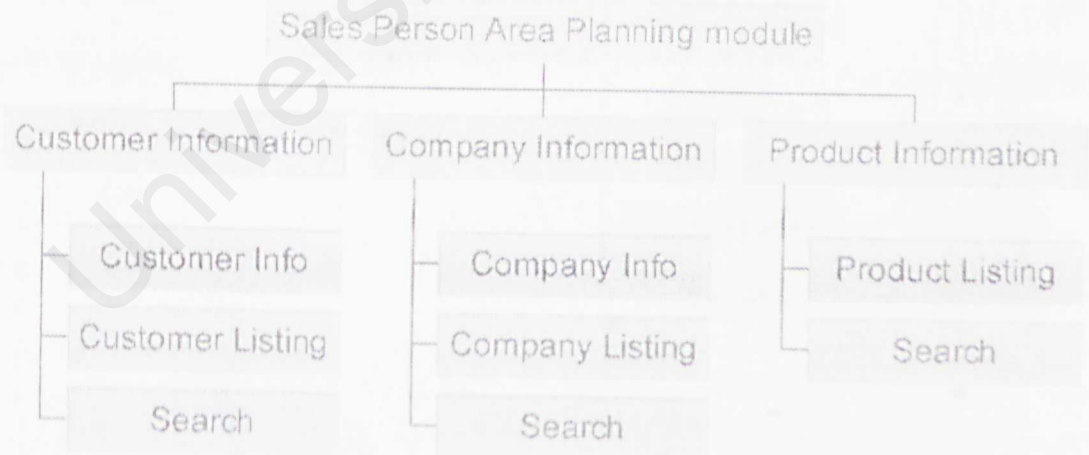
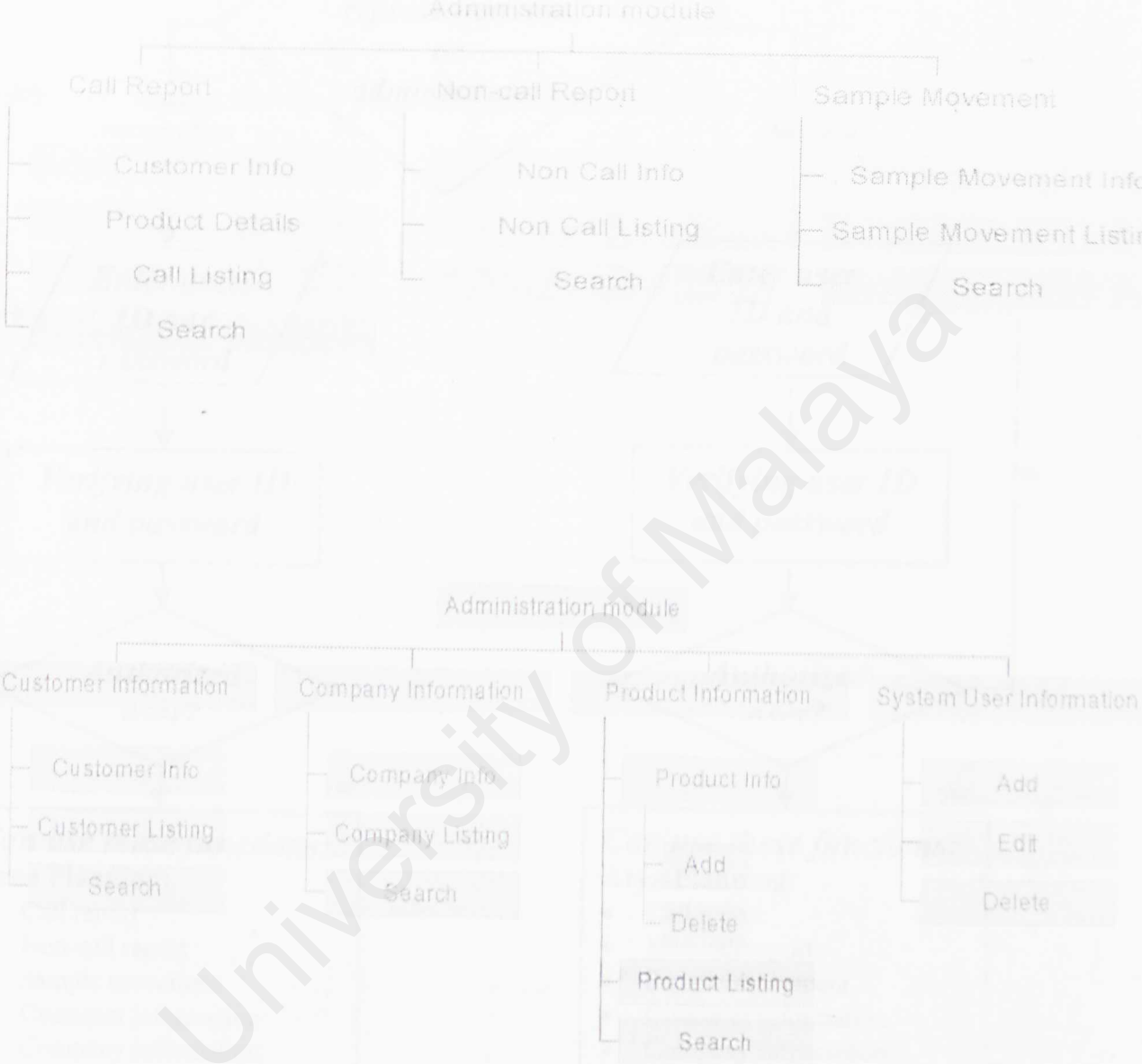


Fig4.14 : Structure of Administration module



4.3 SYSTEM FLOWCHART

Fig4.15:System Flowchart

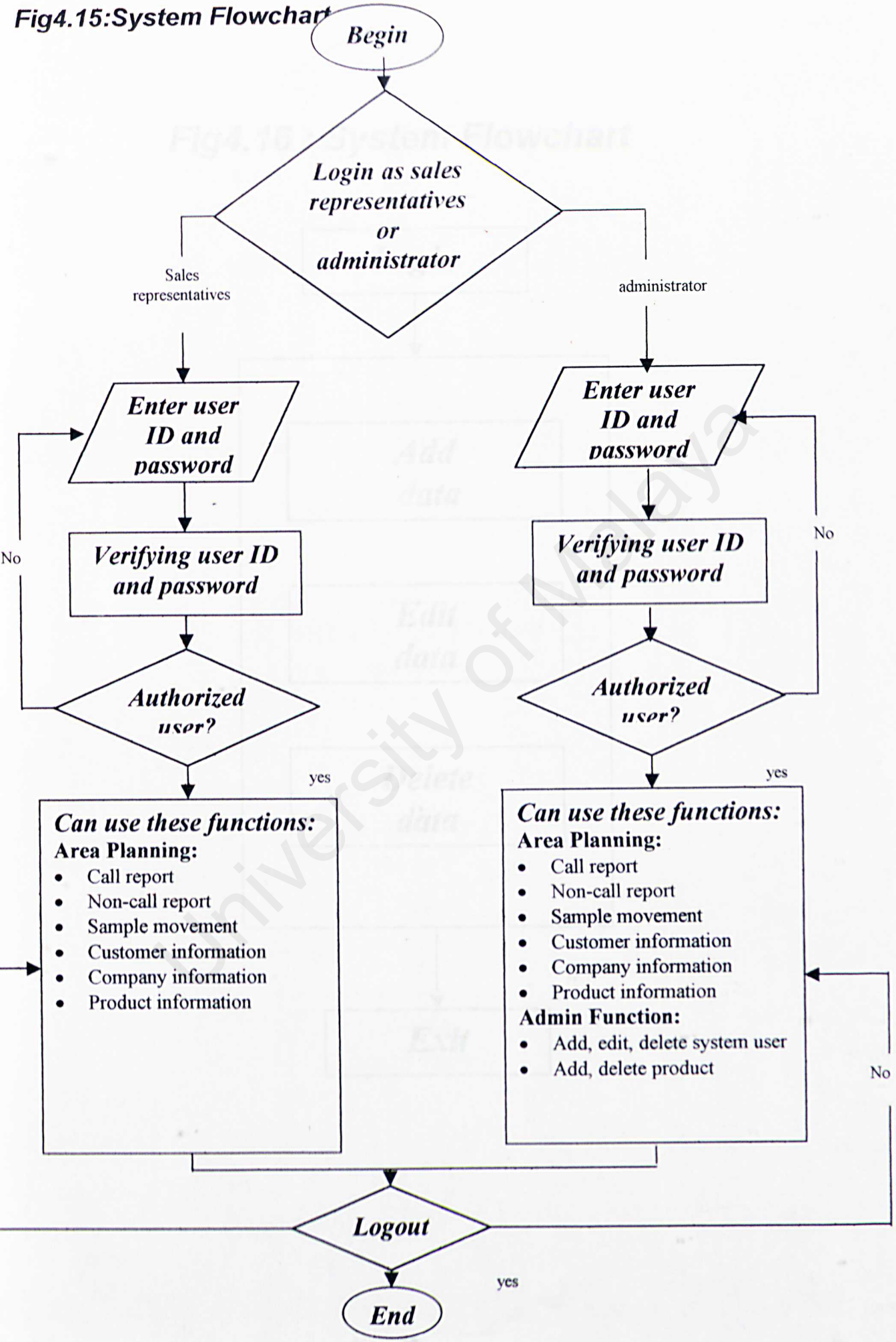


Fig4.16 : System Flowchart

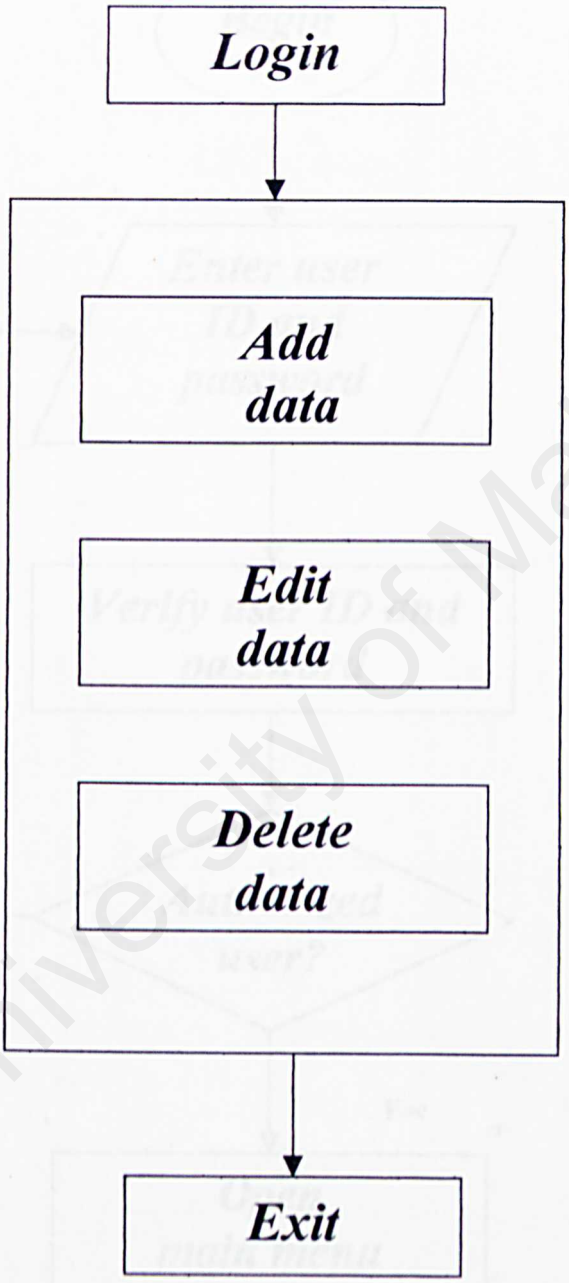


Fig4.17 : Login Flowchart

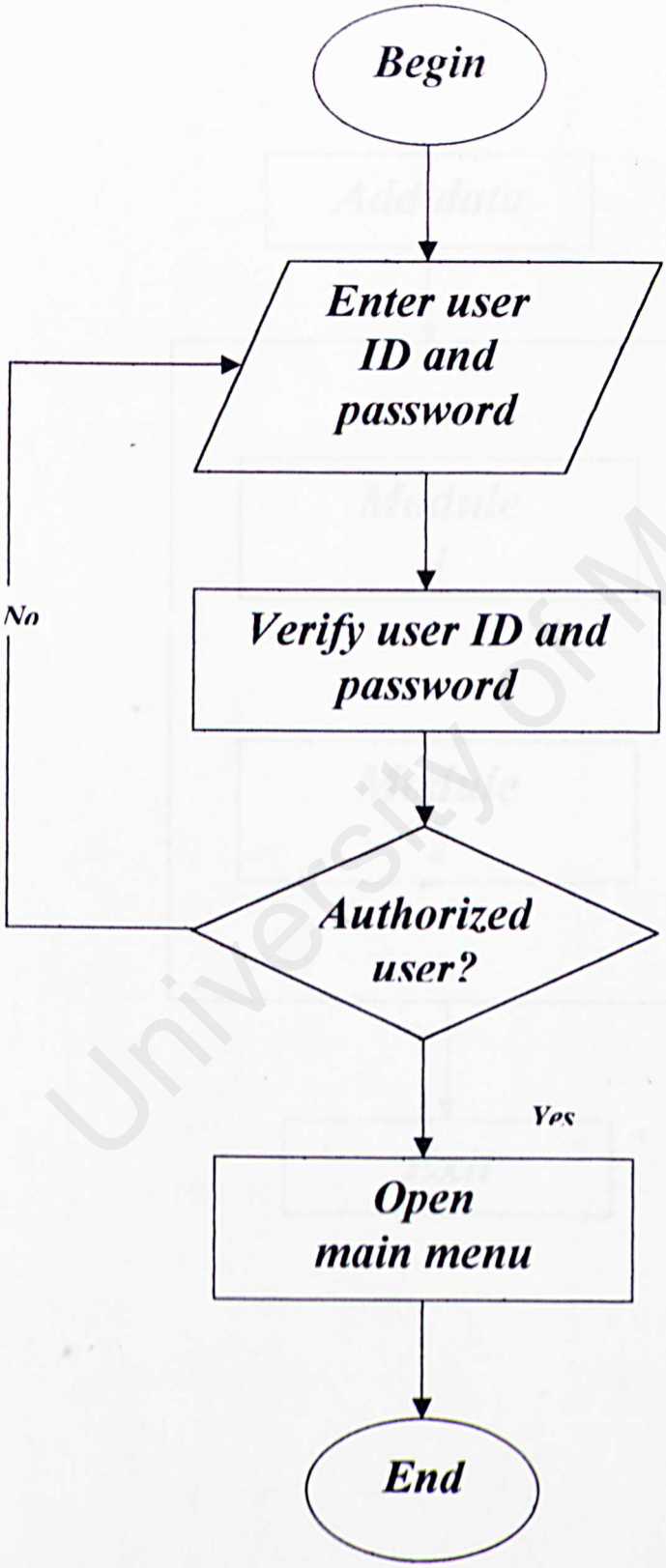


Fig4.18 : Add Data Flowchart

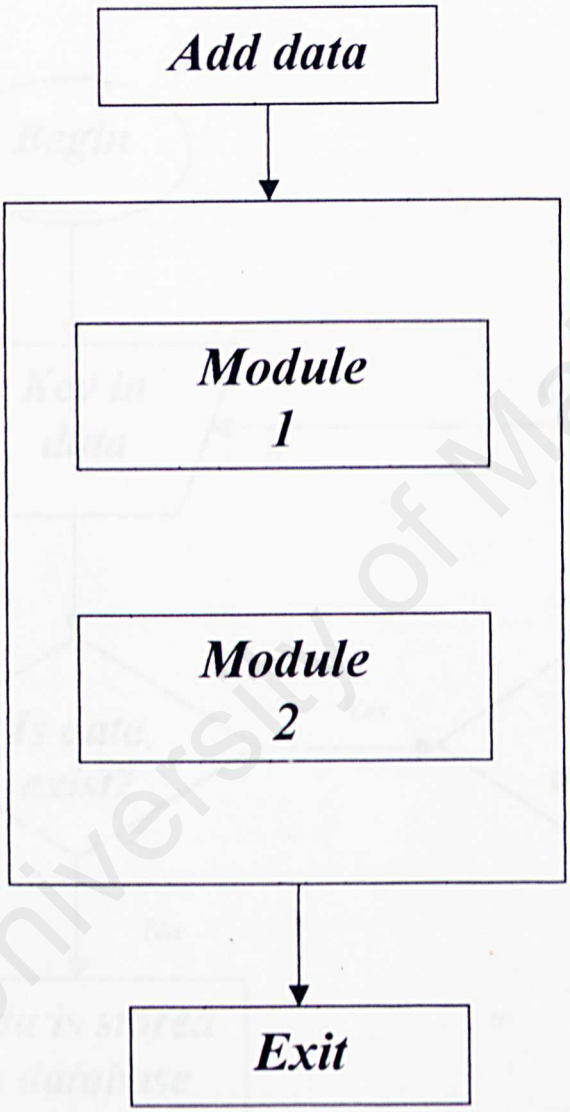


Fig4.19 : Add Data Flowchart (Process)

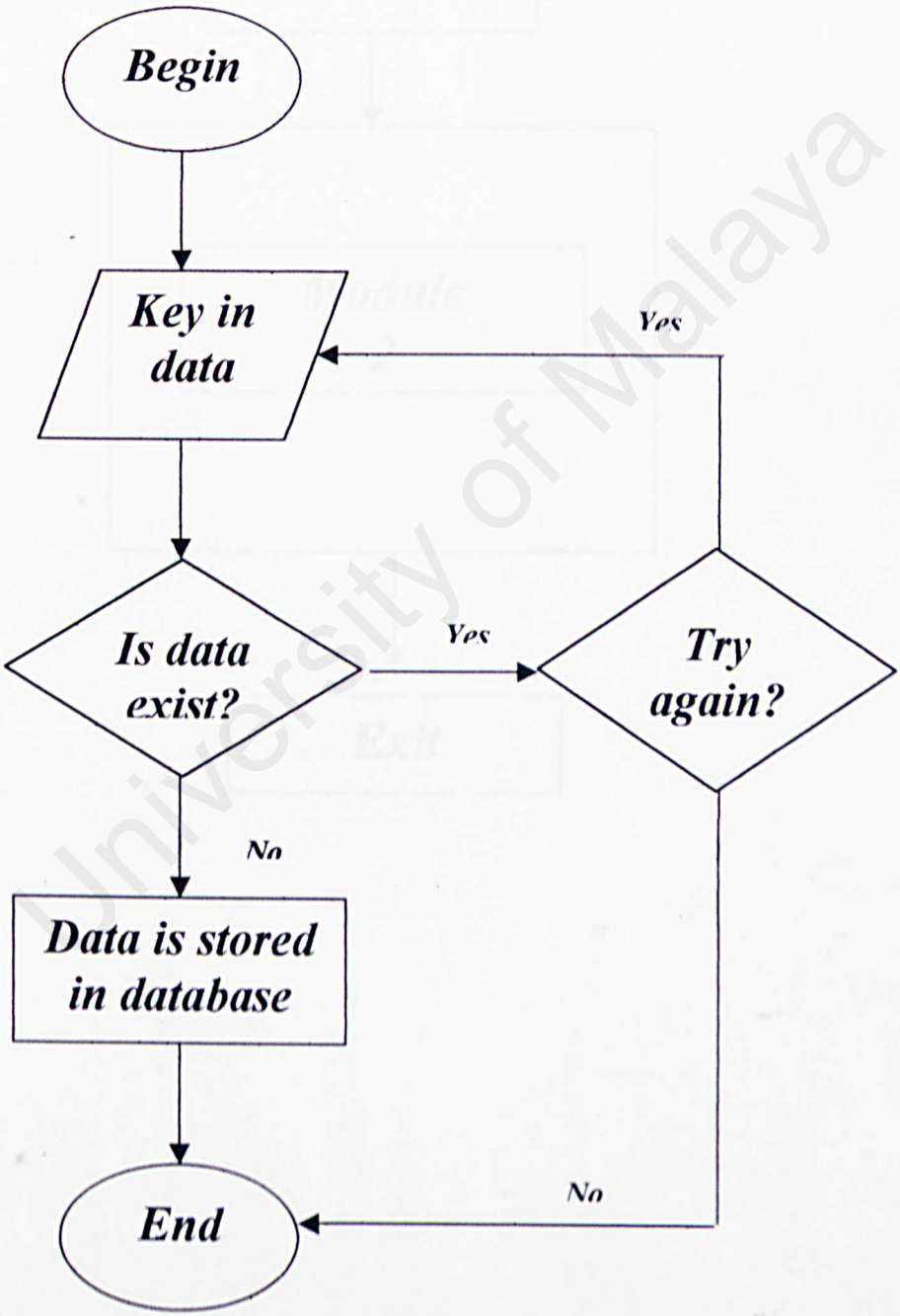


Fig4.20 : Edit Data Flowchart

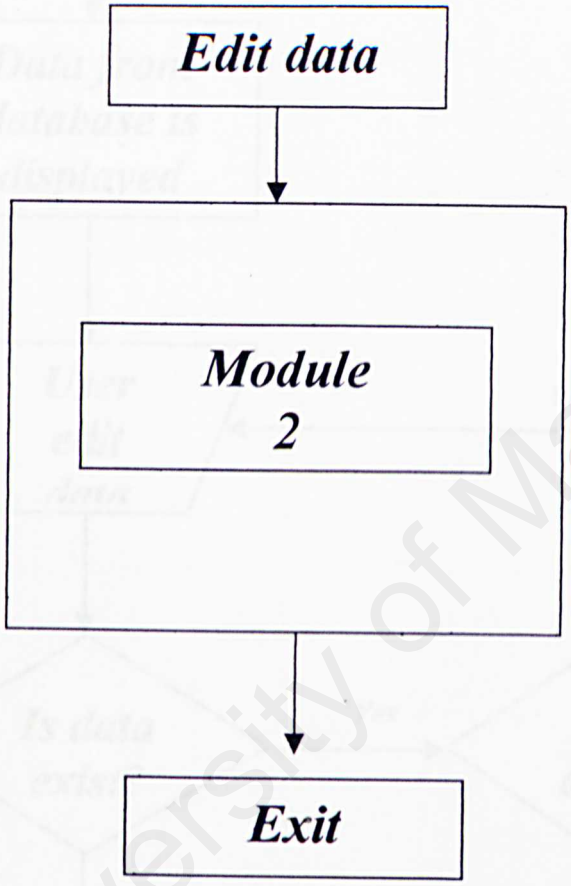


Fig4.21 : Edit Data Flowchart (Process)

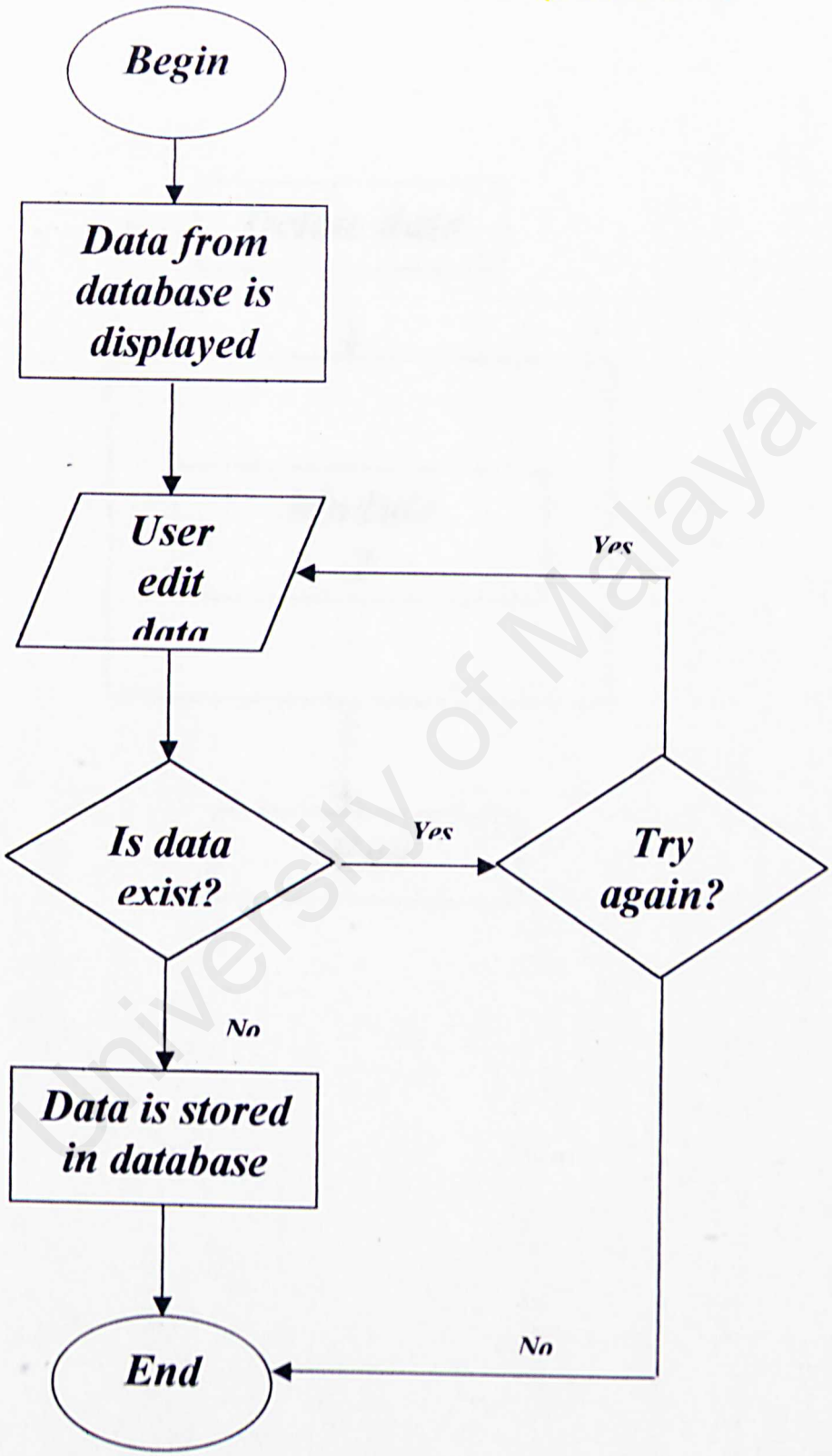


Fig4.22 : Delete Data Flowchart

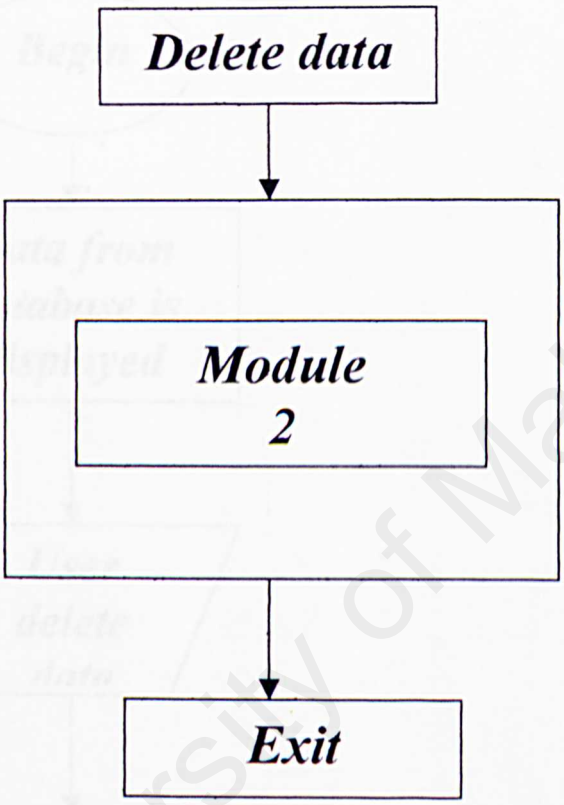


Fig4.23 : Delete Data Flowchart (Process)

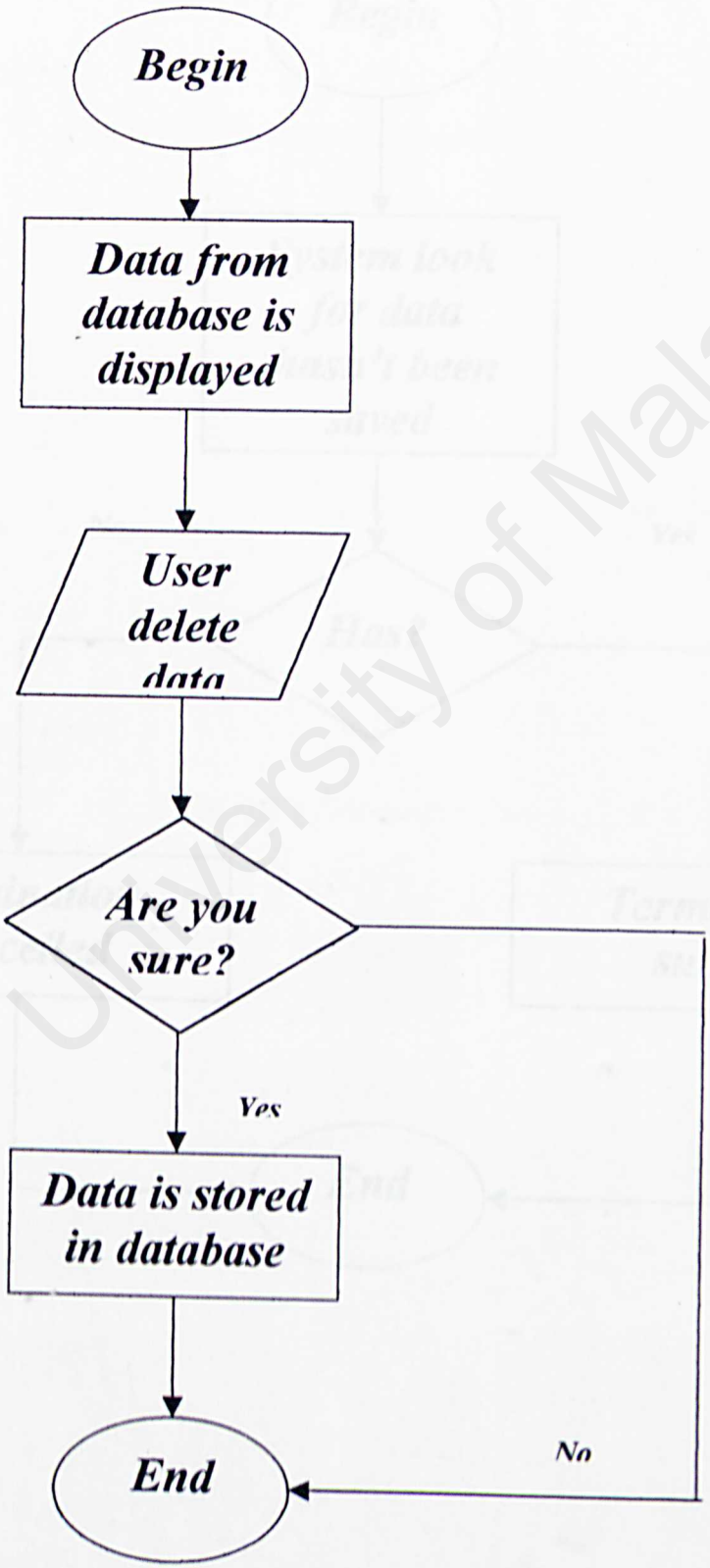
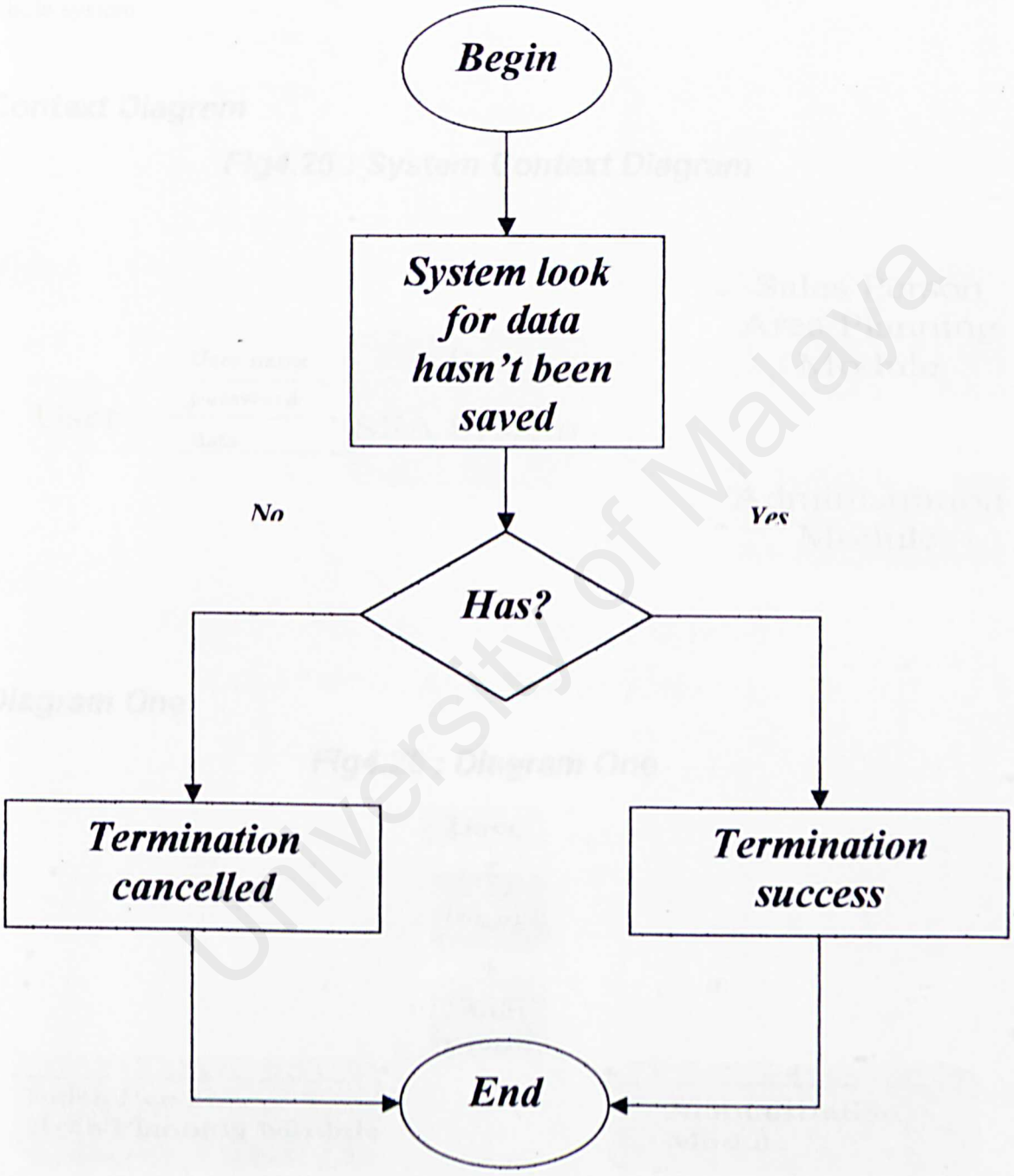


Fig4.24 : Program Termination Flowchart (Process)



4.4 DATA FLOW DIAGRAM

Data flow diagram (DFD) shows the flow of data and logic within a system. For SFA System, only context diagram, diagram one and child diagram already can show the whole system.

Context Diagram

Fig4.25 : System Context Diagram

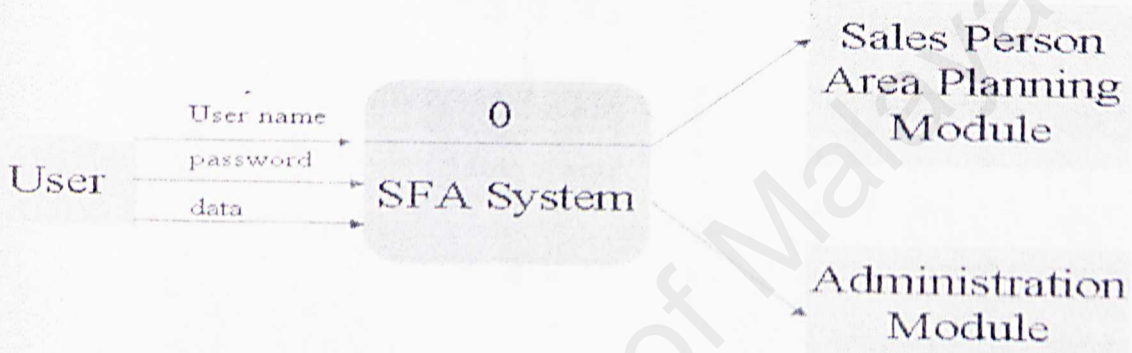
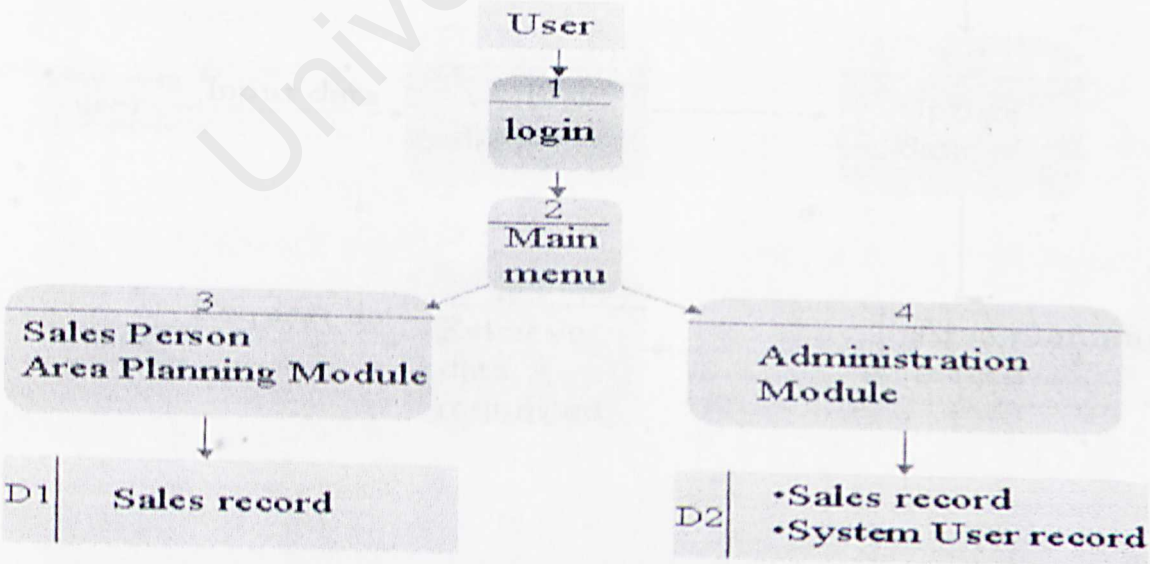


Diagram One

Fig4.26 : Diagram One



Child Diagram

Fig4.27 : Process 1 -- Login Process

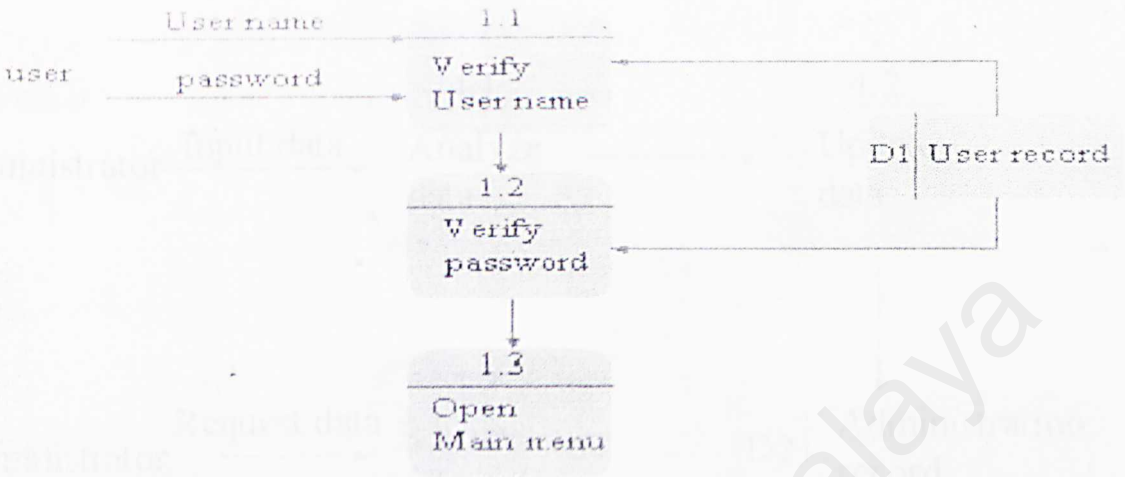


Fig4.28 : Process 2 – Process Occurred In Sales Person Area Planning Module

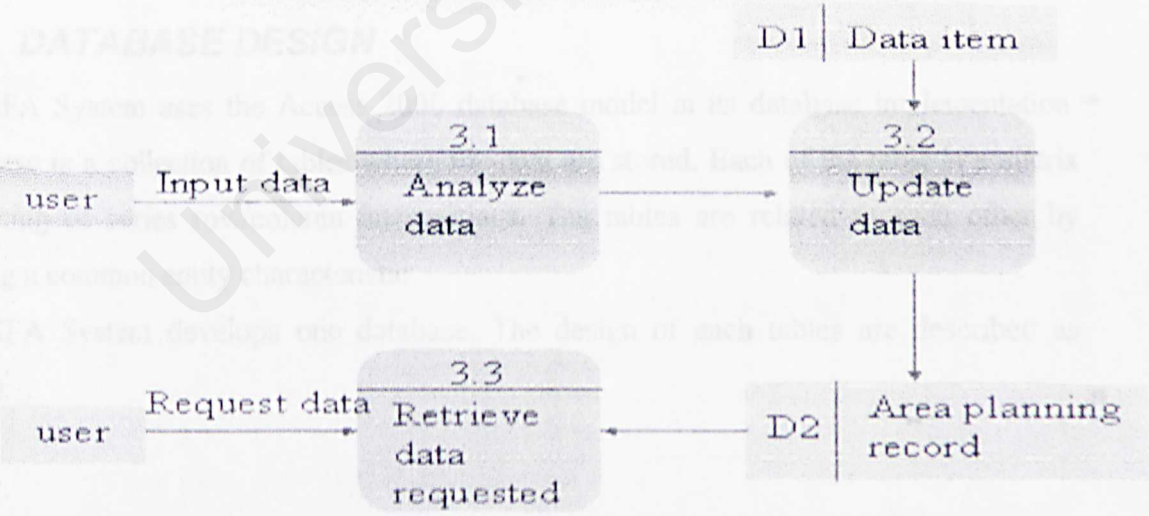
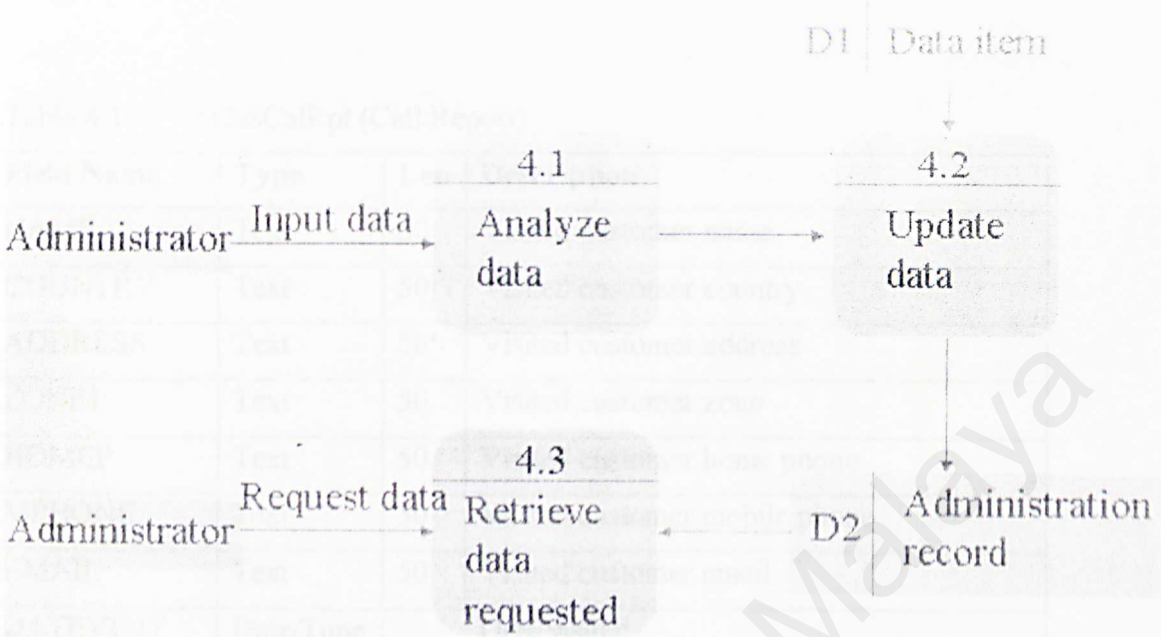


Fig4.29 : Process 3 – Process Occurred In Administration Module



4.5 DATABASE DESIGN

The SFA System uses the Access 2000 database model in its database implementation. Database is a collection of tables where the data are stored. Each of the table is a matrix consisting of series row/column intersections. The tables are related to each other by sharing a common entity characteristic.

The SFA System develops one database. The design of each tables are described as follow:

Table structure for Sales Representatives Area Planning module and Administration module in Access 2000

Table 4.1 : CusCalRpt (Call Report)

Field Name	Type	Len	Description
NAME	Text	50	Visited customer name
COUNTRY	Text	50	Visited customer country
ADDRESS	Text	50	Visited customer address
ZONE1	Text	50	Visited customer zone
HOMEP	Text	50	Visited customer home phone
MPHONE	Text	50	Visited customer mobile phone
EMAIL	Text	50	Visited customer email
DATEVISIT	Date/Time		Date visited
SALAMOUNT	Text	50	Sales amount if have any sales being made
PRODUCT1	Text	50	Product sold if have any sales being made
CALLTYPE1	Text	50	The way to promote the product

Table 4.2 : NonCallListing (Non-call Report)

Field Name	Type	Len	Description
noncalltype	Text	50	Non call type – indicate what the sales person does when he / she does not visit customers.
staffid	Text	50	Staff ID
datefrom	Date/Time		Begin date
dateto	Date/Time		End date

Table 4.3 : SamMovList (Sample Movement)

Field Name	Type	Len	Description
SamType	Text	50	Sample type
Sample	Text	50	Sample name
SamDate	Date/Time		Sample movement occurred date
LotNo	Text	50	Lot number
SIR_SOF	Text	50	SIR / SOF number
Fr	Text	50	From who
To1	Text	50	To who
QtyOnHand	Text	50	Quantity on hand
NoGiven	Text	50	Number given

Table 4.4 : CUSTOMERINFO (Customer Information)

Field Name	Type	Len	Description
NAME	Text	50	Customer name
COUNTRY	Text	50	Customer country
ADDRESS	Text	50	Customer address
ZONE1	Text	50	Customer zone
COMPANY	Text	50	Customer's company name
HOMEP	Text	50	Customer home phone
MPHONE	Text	50	Customer mobile phone
EMAIL	Text	50	Customer email

Table 4.5 : COMPANYINFO (Company Information)

Field Name	Type	Len	Description
COMNAME	Text	50	Customer's company name
CUSNAME	Text	50	Customer name
COUNTRY	Text	50	Customer's company country
ADDRESS	Text	50	Customer's company address
ZONE1	Text	50	Customer's company zone
PHONE	Text	50	Customer's company phone
EMAIL	Text	50	Customer's company email

Table 4.6 : PRODUCTINFO (Product Information)

Primary key : PRODCODE

Field Name	Type	Len	Description
PRODCODE	Text	50	Product code
PRODNAME	Text	50	Product name
PRODTYPE	Text	50	Product type
PRODAQTY	Text	50	Product available quantity
PRODDESC	Memo		Product description

Table 4.7 : Privilege (System User Privilege)

Field Name	Type	Len	Description
PrivilegeID	Text	50	Privilege ID for system user
Privilege	Text	50	Privilege for system user

Table 4.8 : UserInfo (System User Information)

Field Name	Type	Len	Description
USERID	AutoNumber		System user ID
USERNAME	Text	50	System user name
PASSWORD1	Text	50	System user password
EMAIL	Text	50	System user email
PRIVILEGE	Text	50	System user privilege
PRIVILEGEID	Text	50	System user privilege ID
PHONE	Text	50	System user phone

4.6 USER INTERFACE DESIGN

The user interface for the SFA System has also been given top priority beside the functionality design. ASP will be the developing tools used. At this point in the project, the interface designs are in the preliminary stages. A definite interface design will only emerge after some degree of modification and feedback, which will be done iteratively during the implementation phase.

At this early stage, the user interface was decided to be easy for the users to understand and navigate. The design of the interfaces are followed the guidelines as below:

- Strive for consistency

  The interface design is stress on the consistency format for command input, data display, menu selection and placing the control objects.

- Reduce the short-term memory load

  The system users are not required to memorize the information from screen to screen during browsing or reservation process.

- Provide confirmation and verifying message

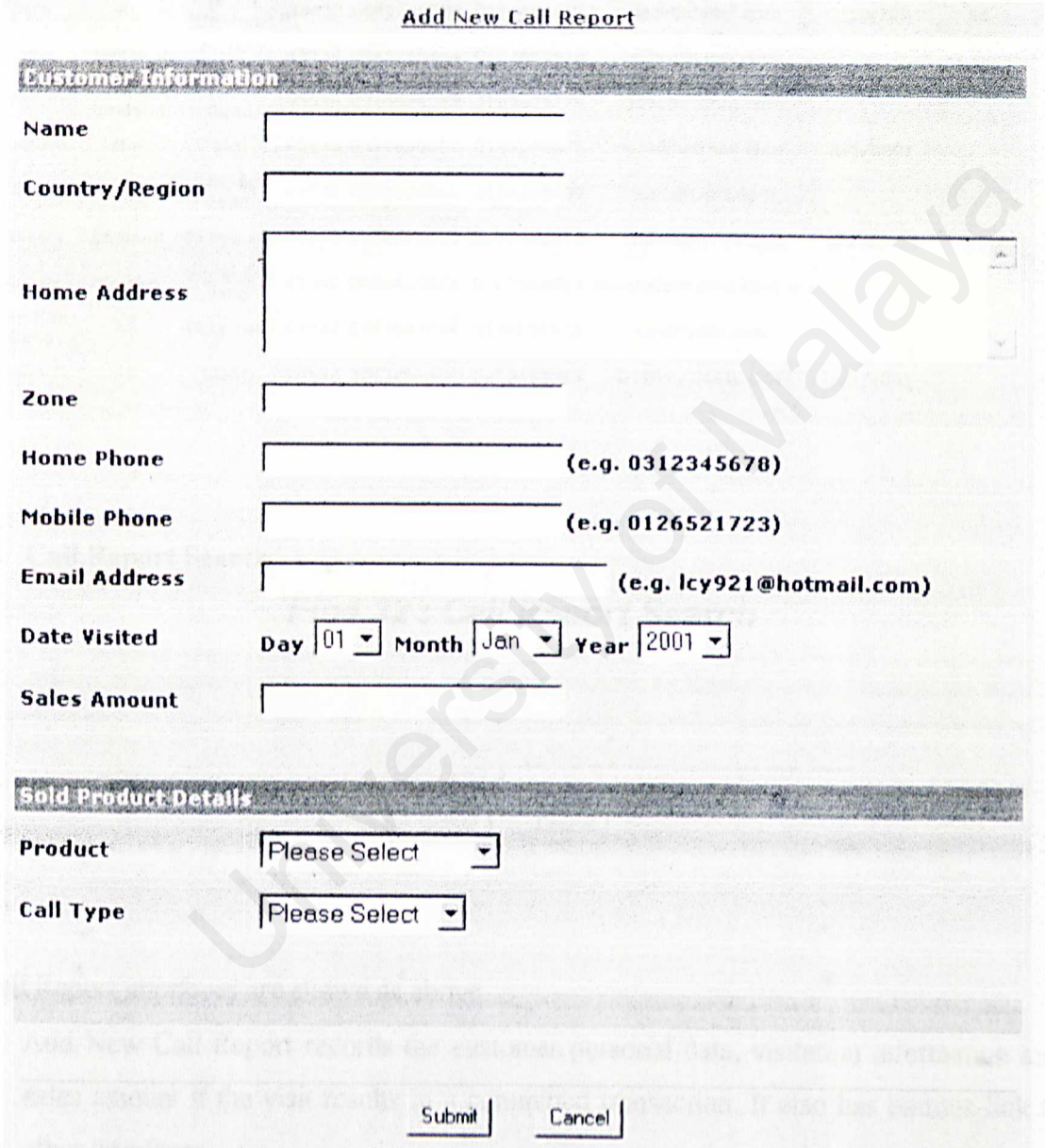
  It provides a confirmation process that asks for verification of any non-trivial destructive action such as deletes record.

The brief description and the interface would be shown.

Call Report:

1. **Add New Call Report**

Fig4.30 : Add New Call Report



2. Call Report Listing

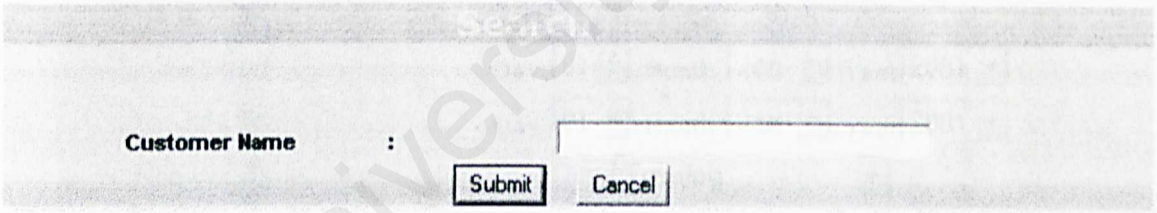
Fig4.31 : Call Report Listing

Call Report Listing

Name	Country	Address	Zone	Home Phone	Mobile Phone	Email	Date Visited	Sales Amount	Product	Call Type
cmc	AS	as	46475	8792681735	7896875687	jkl@gj.cd	8/26/2001	67	comics	Brochure
Dennis	Sibu	10,sec 17	68757	7856757576	0122786757	dennis@lycos.com	1/3/2001	34	History	Video Show
Jack	KL	54,Jln Ibrahim	32432	0489796509	0124658697	jack@deitel.com	5/10/2001	23	Cooking Recipe	Brochure
John	Mentakab	76,Tmn Mayang	43534	0945355464	0197865578	john@lycos.com				
Joseph	New Zealand	67,Ipoh Road	43536	0934534543	0129089779	joseph@ibm.com				
Patricia	Miri	gjgj	45646	0379695858	0127868475	pat@hotmail.com	1/1/2001		Please Select	Please Select
Sam	America	76,rfg road	43538	0323534566	0136868699	sam@DoIt.com				
Shawn	England	45,ry road	78968	0978575969	0127986868	shawn@lycos.com	9/28/2001	56	Cooking Recipe	On Site Display
Susan	Melaka	56,Jln Chi Jang	43540	0435456566	0107866533	susan@creative.com.my				
Tan Kok Seng	AS	45,ry road	43542	0743543564	0176696970	tan@lycos.com				
vin	AS	SDAD	12132	3243254354	0123453543	DE@HOTMAIL.COM	3/3/2001		Cartoon	Video Show

3. Call Report Search

Fig4.32 : Call Report Search



Call Report interfaces are shown as above.

- Add New Call Report records the customer personal data, visitation information and sales amount if the visit results in a committed transaction. It also has buttons link to other interfaces.
- Call Report Listing lists out all the key in information about call report.
- Call Report Search allows the users to search for certain call report information.

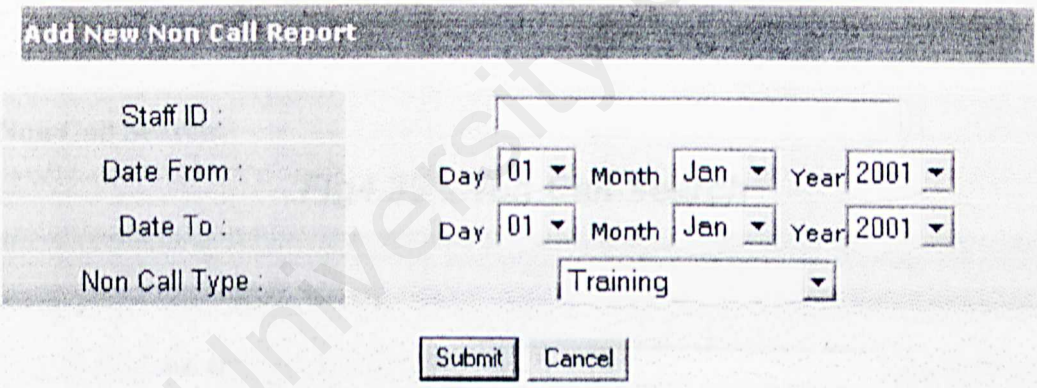
Non-call Report:

In the event that the sales representatives is not able to attend to customers due to activities like training, conferences or illness, that representatives will have to log that activity into the system through Non-call reports. This is to ensure that their superiors are aware of this and do not penalize them for not reaching the call quota on that particular day.

The activity that can be selected for this report is configurable in the system. The user just has to enter the dates that this activity is valid for. With this information, managers can make a better measurement of the representative's productivity by not taking these days into account.

1. **Add New Non Call Report**

Fig4.33 : Add New Non Call Report



2. Non Call Listing

Fig4.34 : Non Call Listing

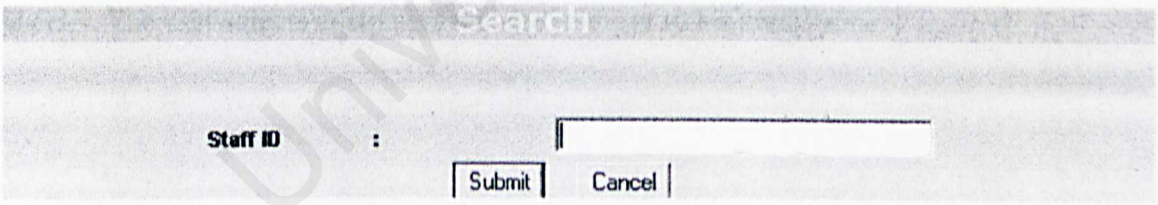
Non Call Listing

Staff ID	Date From	Date To	Non Call Type
ABC123	1/1/2002	1/1/2002	Sick
ABC124	3/29/2001	4/4/2001	Annual Leave
ABC23	1/1/2001	3/3/2001	Training
ABC43	1/1/2001	2/1/2001	Emergency Leave
ABC45	1/6/2001	3/6/2001	Sick
ABC46	1/2/2001	2/3/2001	Annual Leave
ABC787	1/1/2001	3/3/2001	Training
ABC90	4/10/2001	10/11/2001	Training
ABC92	3/6/2001	3/6/2001	Sick
ABC94	7/12/2001	8/12/2001	Emergency Leave
ABC96	1/1/2002	2/2/2002	Training
WER34	1/1/2001	1/1/2001	Annual Leave

Back To Main Page

3. Non Call Search

Fig4.35 : Non Call Search



Sample Movement:

This sample movement is not meant to be a full-fledged inventory system with warehouses, stock takes and delivery agents. However, it does provide basic inventory functionalities like quantity control and lot number tracking. In this environment, the sales representatives act as repositories of samples, similar to a warehouse.

In our case, there are 3 basic sample movement types:

- Samples come in from distributors
- Samples get distributed among managers and then to sales representatives
- Sales representatives issue samples to prospective customer

Any request for samples from distributors has to be followed by a physical **Sample Internal Requisition (SIR)** form. This SIR document number has to be entered into the system for audit checks in future. The list of distributors is configurable in the system.

Transfer of samples among company employees is a common event. Hence there is no need for any physical documents for that. Users are saved the effort of keying the sample, lot number and any other information because these values already pre-populated. The system keeps track of the amount of samples that each user has. It display this list and user just have to key in the amount he is giving and to whom. This is a faster and safer way compared to conventional method.

Samples going out of the company have to be followed by a physical **Sample Order Form (SOF)**. This SOF document number has to be entered into the system for audit checks. The user selects customers that are relevant to his area / zone.

1. Add New Sample Movement

Fig4.36 : Add New Sample Movement

Add New Sample Movement

Sample :	
Type :	
Lot Number :	
SIR/SOF Number :	
Date :	Day 01 Month Jan Year 2001
Quantity On Hand :	
Number Given :	
From :	
To :	

Submit Cancel

2. Sample Movement Listing

Fig4.37 : Sample Movement Listing

Sample Movement Listing

Sample	Type	Lot Number	SIR/SOF Number	Date	Quantity On Hand	Number Given	From	To
Cartoon	entertainment	12349	98769	10/6/2001	45	23	Alex	Pat
Chemistry	reference	12351	98771	8/26/2001	646	26	Gerald	Wang
Chinese	comics	12345	98765	4/24/2001	43	12	Avin	Wan Seng
Comics	entertainment	12348	98768	12/24/2001	56	23	Soon	Avin
Cooking Recipe	cooking	12347	98767	6/5/2001	65	34	Sam	Dick
Creative	skills	12353	98773	10/30/2001	46	12	Susan	Adeline
Drawing	skills	12354	98774	9/6/2001	75	13	Vincent	Lex
DSDD	WE	231344345	432434535	1/1/2001	23	2	MINGCHIN	WAN
Environmental	reference	12352	98772	9/1/2001	67	22	Peng	Seng
History	reference book	12346	98766	1/5/2001	67	20	Jordan	Crystal
History	reference	12350	98770	7/25/2001	87	22	Desc	Johnnes
Mathematics	reference book	12360	98780	1/1/2001	54	23	Avin	mc

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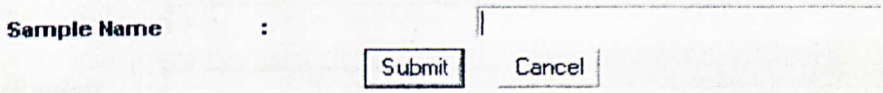
3. Sample Movement Search

Fig4.38 : Sample Movement Search



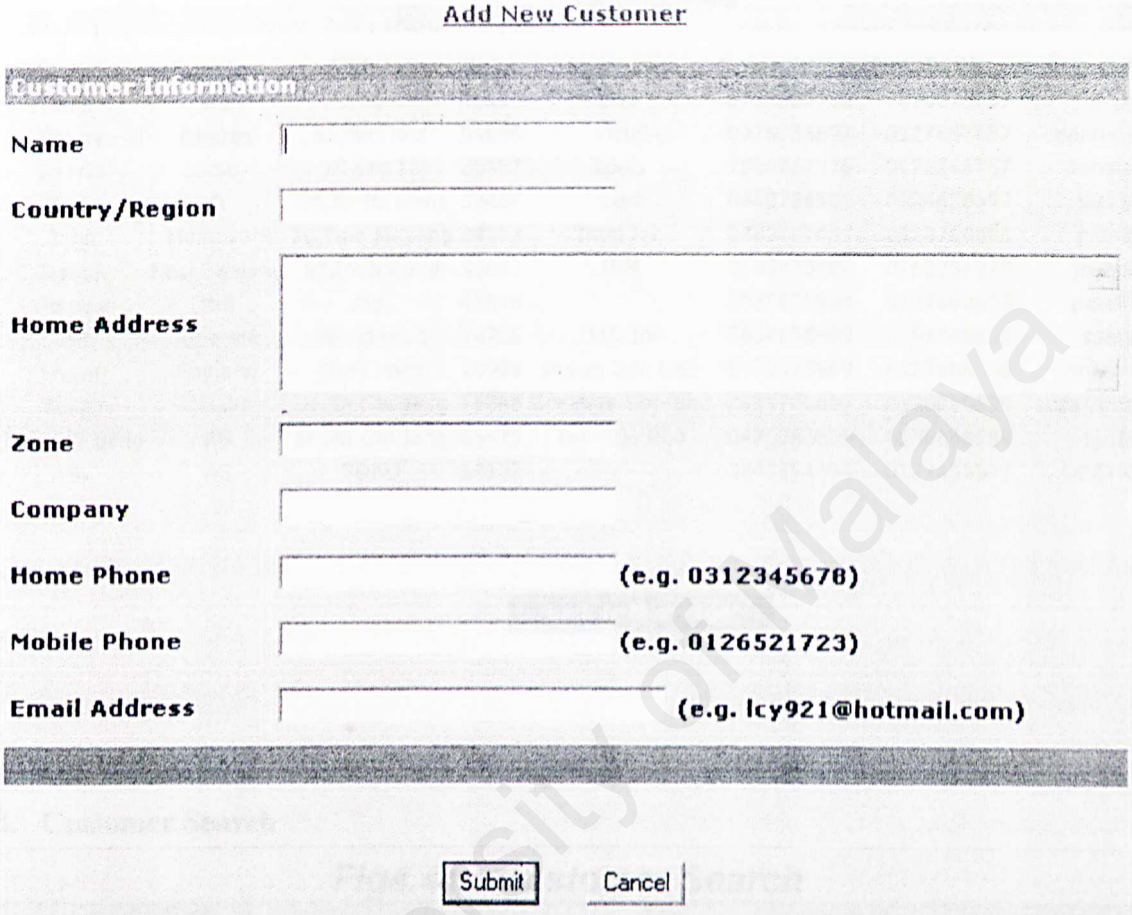
Customer Information:

Customer Information is a part of the corporate CRM knowledge base. The customer database stores personal information. Personal information ranges from name, address, phone and email. This information helps the sales representatives in their approach with customers. Equipped with all these information, the sales representatives can prepare themselves with a proper selling 'pitch' before meeting the customers.

The customer is also linked to the company that he serves. This will be explained in Company information section.

1. Add New Customer

Fig4.39 : Add New Customer



2. Customer Listing

Fig4.40 : Customer Listing

Customer Listing

Name	Country	Address	Zone	Company	Home Phone	Mobile Phone	Email
cmc	AS	as	46475	Dick	8792681735	7896875687	jkl@gj.cd
Danny	Cheras	43,Jln Duta	54636	Viztel	0376758697	0127867857	danny@mailcity.com
Dennis	Sibu	10,sec 17	68757	Louis	7856757576	0122786757	dennis@lycos.com
Jack	KL	54,Jln Ibrahim	32432	Serf	0489796509	0124658697	jack@deitel.com
John	Mentakab	76,Tmn Mayang	34353	Intel Inc	0789787457	0128768586	john@lycos.com
Joseph	New Zealand	67,Ipoh Road	79067	IBM	0689778696	0165756970	joseph@ibm.com
Patricia	Miri	gjgj	45646		0379695858	0127868475	pat@hotmail.com
Sam	America	76,rfg road	78768	DoIt Inc	0868658689	0197868858	sam@DoIt.com
Shawn	England	45,ry road	78968	shawn Sdn Bhd	0978575969	0127986868	shawn@lycos.com
Susan	Melaka	56,Jln Chi Jang	76868	Creative Sdn Bhd	0689785685	0176869699	susan@creative.com.my
Tan Kok Seng	AS	56,Jln Chi Jang	65575	Tan Sdn Bhd	0476865859	0136868689	tan@lycos.com
vin	AS	SDAD	12132		3243254354	0123453543	DE@HOTMAIL.COM

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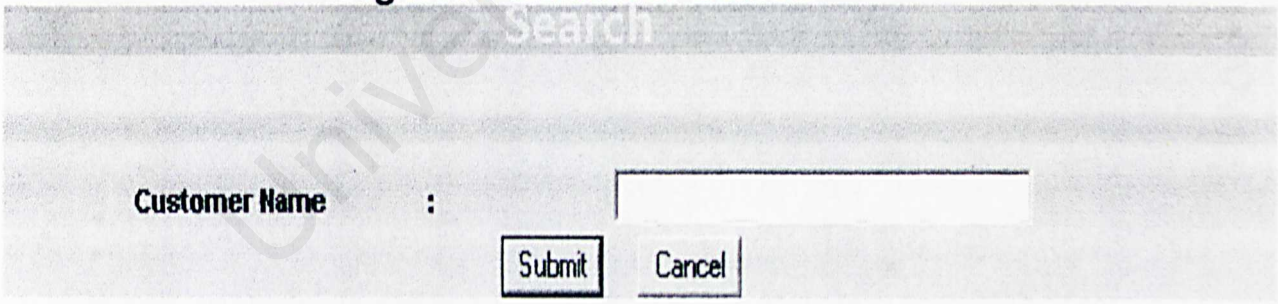
3. Customer Search

Fig4.41 : Customer Search



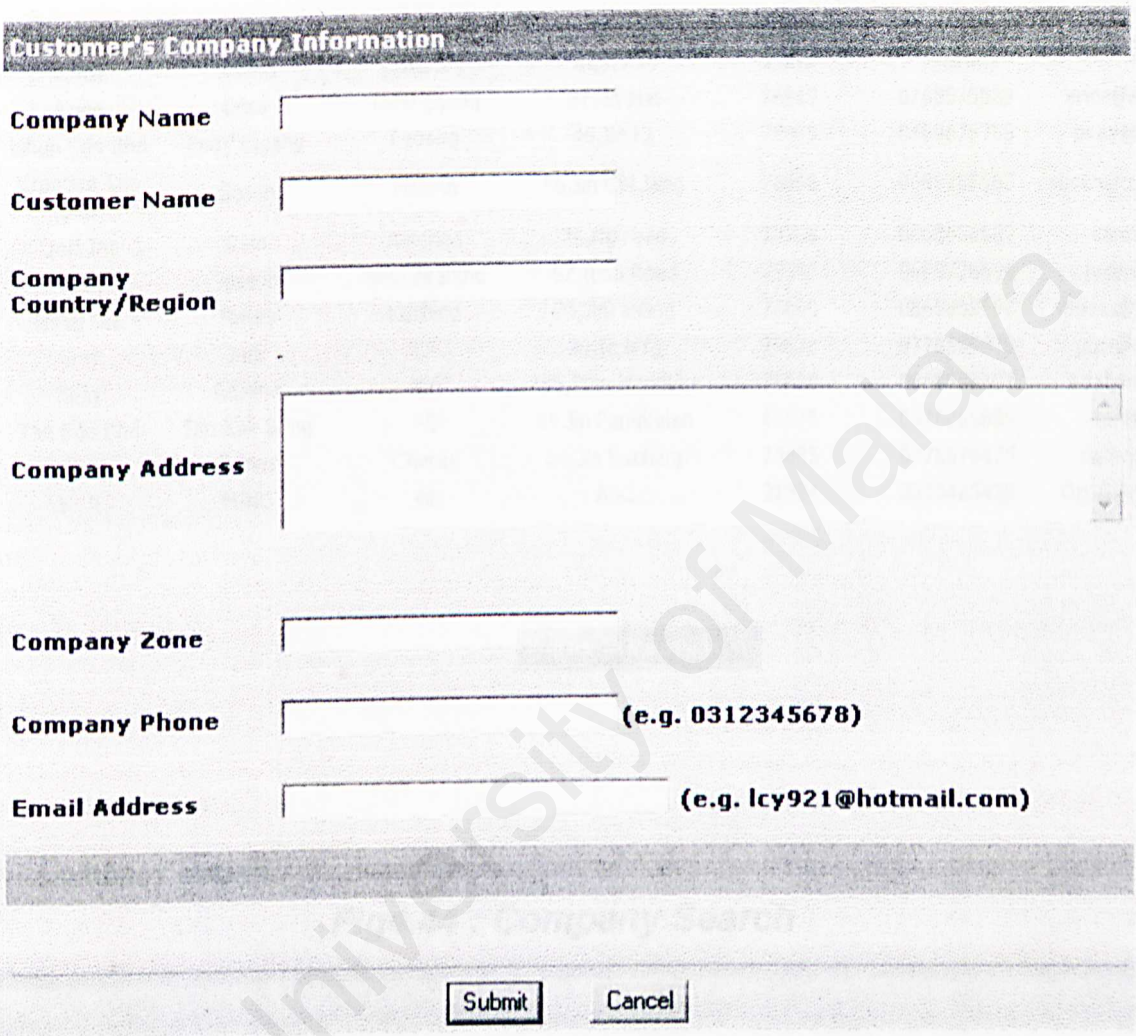
Company Information:

Company information stores details of the companies that a customer works for. There can be cases where several customers come from the same firm. This relationship is linked together in this system. We can have a Company-Customer structure; depending on the actual situation.

Company and customer information can be edited by individuals who have the relevant accesses. However these changes have to pass through an approval process before it gets updated into the central database. This process ensures that the data is protected and that only valid changes are passed into the system.

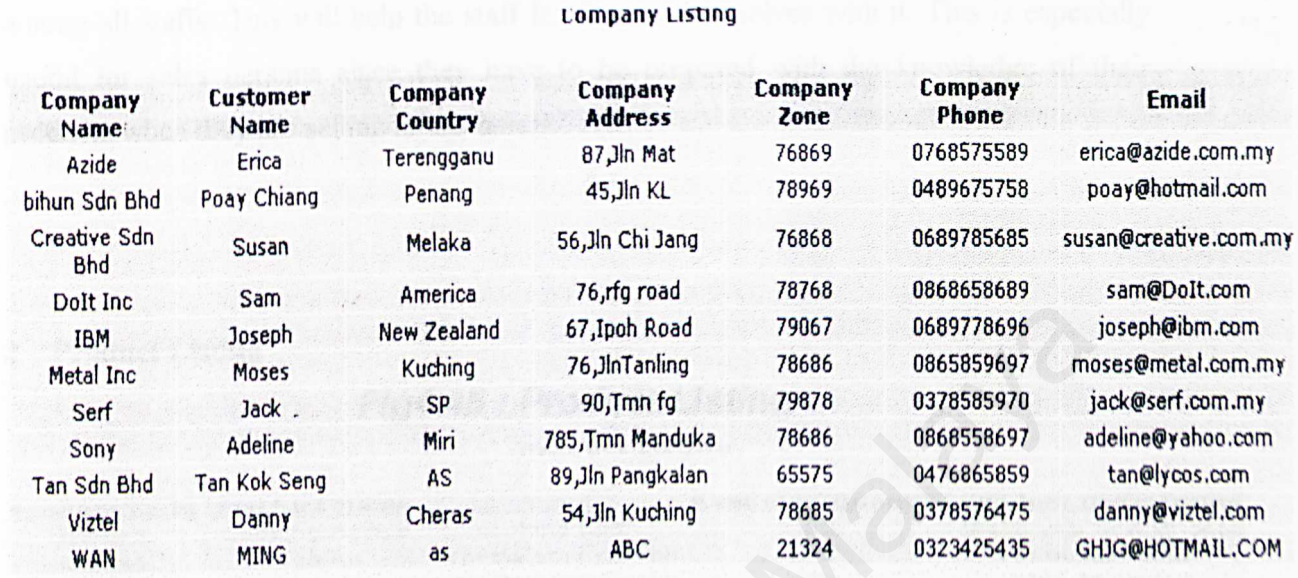
1. Add New Company

Fig4.42 : Add New Company



2. **Company Listing**

Fig4.43 : Company Listing



Company Listing

Company Name	Customer Name	Company Country	Company Address	Company Zone	Company Phone	Email
Azide	Erica	Terengganu	87,Jln Mat	76869	0768575589	erica@azide.com.my
bihun Sdn Bhd	Poay Chiang	Penang	45,Jln KL	78969	0489675758	poay@hotmail.com
Creative Sdn Bhd	Susan	Melaka	56,Jln Chi Jang	76868	0689785685	susan@creative.com.my
DoIt Inc	Sam	America	76,rfg road	78768	0868658689	sam@DoIt.com
IBM	Joseph	New Zealand	67,Ipoh Road	79067	0689778696	joseph@ibm.com
Metal Inc	Moses	Kuching	76,JlnTanling	78686	0865859697	moses@metal.com.my
Serf	Jack	SP	90,Tmn fg	79878	0378585970	jack@serf.com.my
Sony	Adeline	Miri	785,Tmn Manduka	78686	0868558697	adeline@yahoo.com
Tan Sdn Bhd	Tan Kok Seng	AS	89,Jln Pangkalan	65575	0476865859	tan@lycos.com
Viztel	Danny	Cheras	54,Jln Kuching	78685	0378576475	danny@viztel.com
WAN	MING	as	ABC	21324	0323425435	GHJG@HOTMAIL.COM

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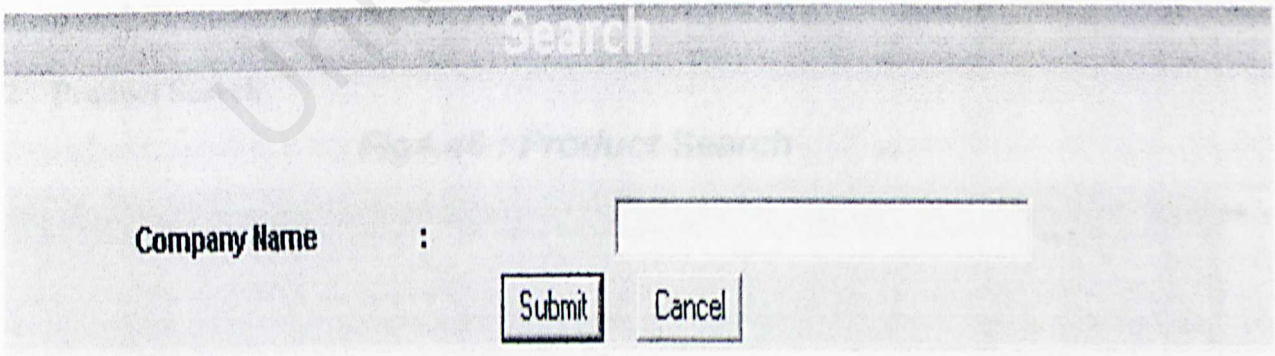
3. **Company Search**

Fig4.44 : Company Search

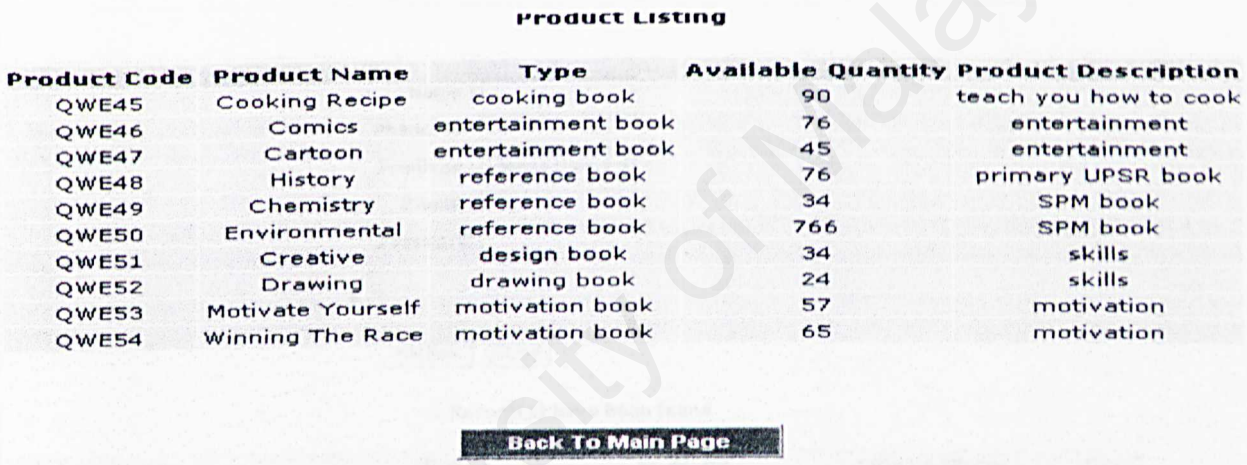


Product Information:

Product information is part of the corporate knowledge base that is supposed to be shared among all staffs. This will help the staff familiarize themselves with it. This is especially useful for sales persons since they have to be prepared with the knowledge of their products when they are selling to customers.

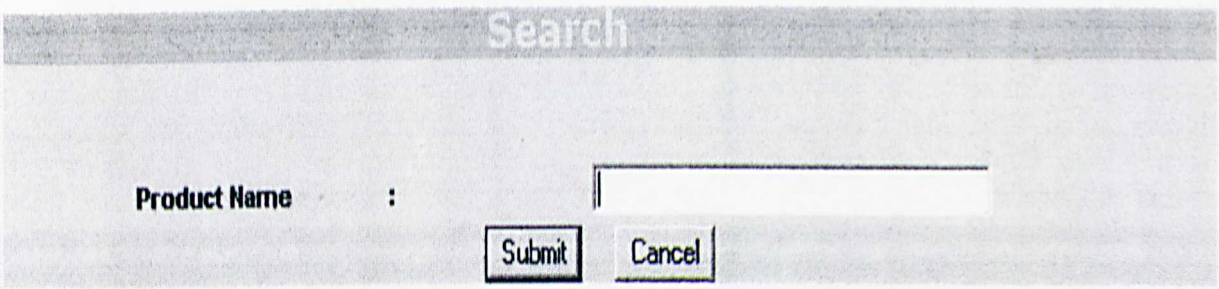
2 Product Listing

Fig4.45 : Product Listing



2 Product Search

Fig4.46 : Product Search



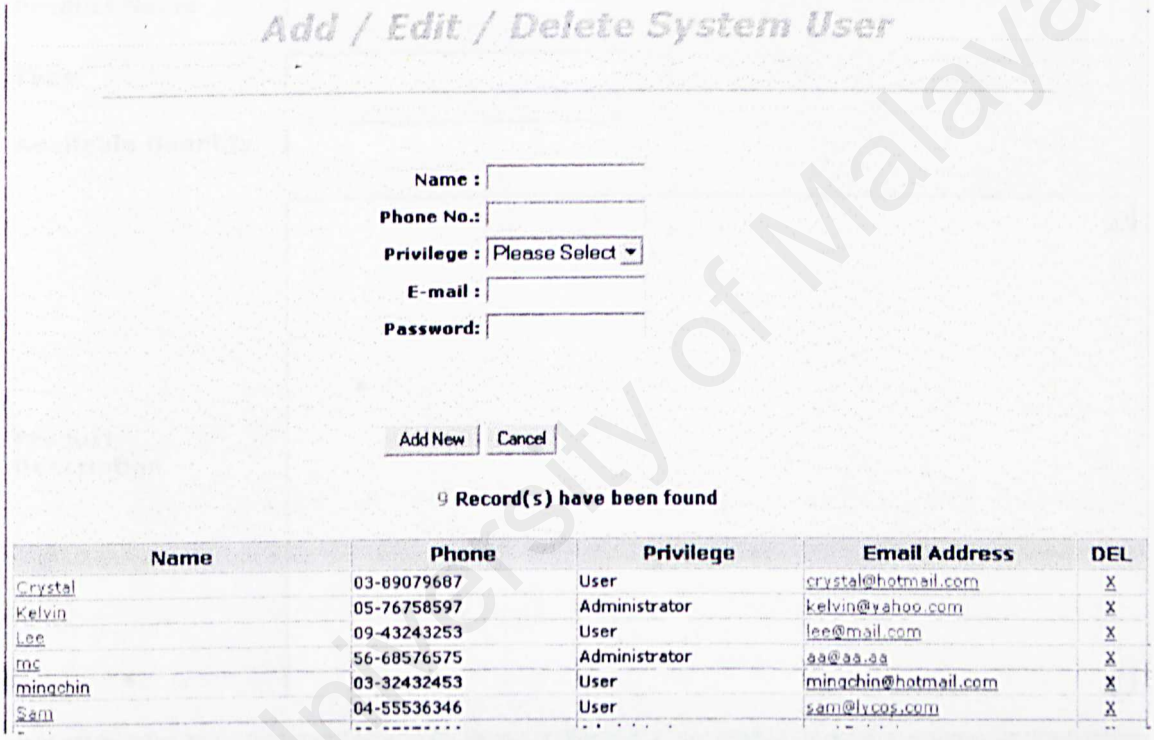
User Interface Design for Administration Module

User Interface for Call Report, Non Call Report, Sample Movement, Customer Information, Company Information and Product Information are the same as the first module. However this module has add-in components. It will be shown as below:

System User Information:

Add / Edit / Delete System User

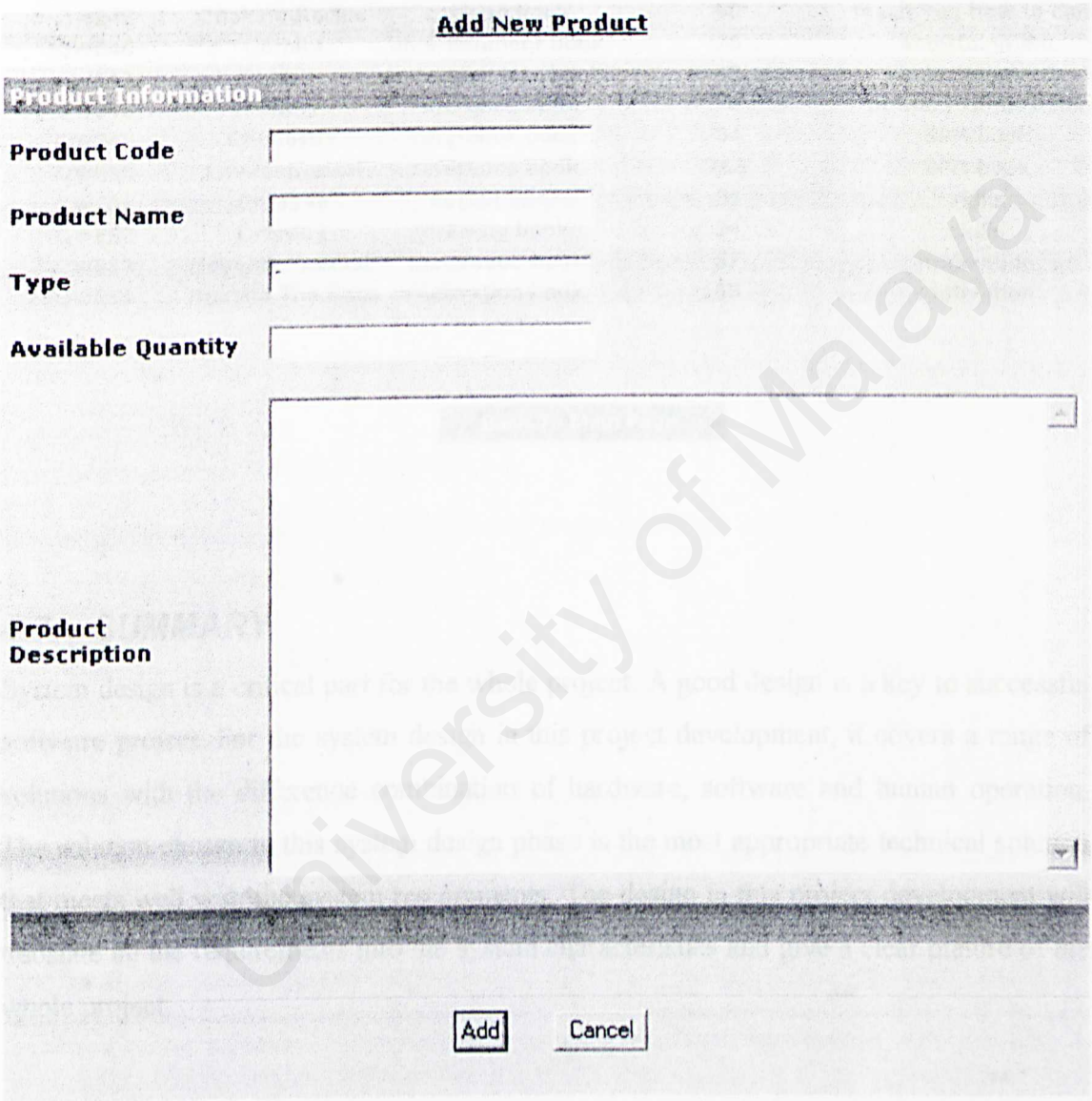
Fig4.47 : Add / Edit / Delete System User



Product Information:

1. Add New Product

Fig4.48 : Add New Product



2 Delete Product

Fig4.49 : Delete Product

Product Listing

Product Code	Product Name	Type	Available Quantity	Product Description	Del
QWE45	Cooking Recipe	cooking book	90	teach you how to cook	X
QWE46	Comics	entertainment book	76	entertainment	X
QWE47	Cartoon	entertainment book	45	entertainment	X
QWE48	History	reference book	76	primary UPSR book	X
QWE49	Chemistry	reference book	34	SPM book	X
QWE50	Environmental	reference book	766	SPM book	X
QWE51	Creative	design book	34	skills	X
QWE52	Drawing	drawing book	24	skills	X
QWE53	Motivate Yourself	motivation book	57	motivation	X
QWE54	Winning The Race	motivation book	65	motivation	X

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4.7 SUMMARY

System design is a critical part for the whole project. A good design is a key to successful software project. For the system design in this project development, it covers a range of solutions with the difference combination of hardware, software and human operation. The solution chosen in this system design phase is the most appropriate technical solution that meets well with the system requirements. The design in this project development will translate all the requirements into the system characteristics and give a clear picture of the whole project.

CHAPTER 5 SYSTEM IMPLEMENTATION

System implementation is the acquisition and integration of the physical and conceptual resources that produce a working system (Meyer, Baber and Pfaffenberger, 1999). System implementation is also a nutshell in the construction of the application and the delivery of the application into the 'production phase'.

5.1 DEVELOPMENT ENVIRONMENT

The development environment is crucial for the rapid development of SFA System . The usage of dynamic and suitable hardware can help accelerating the development or construction of the system. The following sections discuss the hardware and software tools used to develop and document the entire system.

Hardware Development Environment

The hardware used to develop this E-Event Synchronizer are listed below:

- Intel Celeron 455 MHz Processor
- 256 MB RAM
- 52X CD-ROM Drive
- 14.4 GB Hard Disk
- Nvidia Riva TNT2 Model 64 , 15-inch color Monitor
- Standard desktop PC components, including floppy disk drive, printer, scanner and modem

Software Development Environment

Tools Used For System Design and Report Writing

In the early development stage of E-Event Synchronizer, namely the system analysis and design phase, Microsoft Word 2000 (9.0.2720) and Hardcopy are used to capture the system requirements and document ***materials, and also to print the user interface screen.***

Tools Used For System Development

The software tools used for system development are vital to the successful implementation of Web-based Sales Force Automation System. Table below lists out the software used for the development of Web-based Sales Force Automation System.

Table 5.1 Software Tools Used For System Development

Software	Usage	Description
Microsoft Windows 2000 Professional	Development Environment System Requirements	Operating system
Internet Information Server 5.0 (IIS 5.0)	Development Environment System Requirements	Web server
Microsoft Visual Interdev 6.0 / Macromedia Dreamweaver Ultradev	System Development	Code editor & interface design
Microsoft Access 2000	Database Design	Database design, implementation and construction for data storage, manipulation
Microsoft Internet Explorer 5.0	System development & Interface Design	Web Browser
Adobe Photoshop 6.0	Interface Design	Artwork image files, interface graphics, and icon designing

5.2 PROGRAM CODING

The coding phase is undertaken when software is to be developed or modified. During the coding phase, source codes are written and documented in some programming language to implement the program design. The program design must be translated into the form that can be understood by the machine. The code generation step performs this task. If design is performed in a detailed manner, code generation can be accomplished mechanically.

Coding Approach

Generally, there are three major approaches applied in coding methodology, which are Top-Down approach, Bottom-Up approach, and Threads approach.

Top-down Approach

High-level modules are coded, tested, and integrated before higher-level modules.

Bottom-up Approach

Low-level modules are coded, tested, and integrated before higher-level modules.

Threads

A decision is first made on the order in which program functions should be implemented. The modules that support each function are then determined, and each set is then implemented in decreasing order of functional importance.

Among these three approaches, Threads Approach is chosen to be applied in the system of Area Planning module. The advantage of this strategy is that the most important functions are implemented first.

Coding Strategy

Regardless of the type of coding approaches chosen, program code is written whenever is possible, according to the structured programming conventions. These conventions confine the overall coding style to the basic control structures.

Branching Statements that perform a test and then execute some lines of code but not others. Among the main techniques for branching that have been using in the SFA code execution are: If…Then and Select…Case.

Looping Statements that execute a set of code again and again. Two types of looping structures have been using so far. They are the Do…While and For…Next.

Jumping Statements that pause the execution of the current code, jump over to another set of code, and then return. In this case, ASP is needed to jump away from execution of the main body of the code, run through the commands of a particular functions or sub-procedures, before returning to execute the main body of the code.

Coding Format

As the SFA system is using ASP web technology in the development process, all the pages are written in the HTML and ASP format. Each of the files has the extension of .htm or .asp. Scripting languages can be included in the asp files, such as JavaScript , VBScript, and etc. VBScript is chosen to implement the main processing manipulation in this system. VBScript is also used to implement client-side input validation as well as developing the server-side process.

The following is the general format for the asp file used in the coding of this system.

```
<HTML>
<HEAD>
<TITLE></TITLE>

'client side scripting language with VBScript
<SCRIPT LANGUAGE = VBSCRIPT>
.....VBScript goes in here
</SCRIPT>
</HEAD>
<BODY>
```

'server side scripting language with VBScript (sub procedure is not allowed)

<% .....*VBScript goes in here* %>

'server side scripting language with VBScript (sub procedure is allowed)

<*SCRIPT LANGUAGE = VBSCRIPT RUNAT = SERVER*>

.....*VBScript goes in here*

</*SCRIPT*>

</*BODY*>

</*HTML*>

Client-Side Scripts

Client-side scripting is not directly related to ASP at all. It involves scripts writing that will be processed by the browser. When a web page source contains a client-side script, it does not attempt to process the script; instead, it simply downloads the script to the browser as part of the HTTP response, and assumes that the browser will know how to deal with it.

When the browser receives the HTTP response, it needs to process the HTML contained within, which described how it is to display the page. The browser must also take care of the client-side scripts that were download as part of the page.

Server-Side Scripts

A script that is interpreted by the web server is called a server-side script. A server-side script is an instruction set that is processed by the server, and which generates HTML. The resulting HTML is sent as part of the HTTP response to the browser.

VBScript

VBScript brings active scripting to a web variety of environments, including web client scripting in Internet Explorer and web server scripting in Internet Information Server (IIS). VBScript is said to be a glue that holds web browser and web server component together.

VBScript itself is not able to open or modify any files on the user's computer. It will not cause the computer to crash. If an important exchange of information is happening in web page, the user would certainly not want the computer to crash because of an ill-format script.

Moreover, VBScript is much easier to learn than programming language such as Java, C/C++ and other scripting language. Derived from the BASIC language, VBScript should not be difficult for anyone who has any computer program experience.

Coding Principles

Several principles are applied during the development of the system to ensure that the quality and proper structure in the code generated. These principles include the following:

Readability

It is very important when it comes to the future enhancement of the system by other people. Code should be easily read and understood. To achieve this, comments can be used to explain the module or code. Meaningful variables and labels will also be helpful in reading the code.

Maintainability

Code should be to read, corrected and revised. Codes that perform functions for one module should be grouped together and try as much as possible to achieve high cohesion and loose coupling.

Robustness

Code should be robust in terms of handling errors and responding by displaying appropriate error messages and try to avoid system failure. The E-Event Synchronizing System is developed using the event driven approach which means that codes are executed with respond to provocation of certain events such as mouse click.

CHAPTER 6 TESTING

6.1 INTRODUCTION

Software testing is a critical phase of its quality control and assurance. Testing represents the complete and extensive review and challenge on the application design, specifications and codes. During the testing phase, developed program is being tested to determine whether it meets the ordinary requirements. Through various types of testing, the developing program design errors or program coding errors can be identified.

Testing should be done during the software phase, to debug design-time errors. It is then continued during the system integration phase, to uncover run-time bugs. The main difference between testing modules during the development phase and testing them during the system integration phase is that errors can be fixed as they are found during the development phase. The errors during the integration phase should be systematically recorded, and the module with bugs found must be returned to its developing programmer(s) for further fixing and debugging procedures.

Generally, the process of testing usually can be concluded into seven steps, as below:

- Select the boundaries of the test: testing can focus on an individual module in a program , several modules, or the entire program.
- Determine the goal of the test: testing can be used to identify unauthorized, inaccurate, incomplete, ineffective, or inefficient code. A particular test should focus on only one (or a small number) of goals- for example, the performance of the program under the load stress.
- Choose the testing approach: Several testing approaches have been developed and are now widely used- for example, black-box testing and white-box testing.
- Develop the test: test data or test scenarios must be developed to accomplish the goals of the test. In particular, the expected results of the test must be determined.
- Conduct the test: the conduct of the test can involve, for example, executing test data through a program or performing a hand-simulation of the program's execution pattern under test scenarios.

- Evaluate the test result: the actual result obtained under the test must be compared against the expected results. The nature of any discrepancies identified must be determined.
- Document the test: All steps in the testing process must be documented.

6.2 UNIT TESTING

Unit testing focuses on evaluating individual modules within a program. This is the basic testing necessity for any software. For system developed with Active Sever Pages(ASP), the unit testing involved tends to be undertaken for individual modules which constitute substantive pieces of work like Sales Force Automation System, which consist of two major modules: sales representatives Area Planning and administration module.

For this SFA system, two major types of unit tests are being undertaken. The first type, static analysis tests, evaluates the quality of a module through a direct examination of source code. The module is not executed on a machine, although it might be executed in mind. There are three main types of static analysis tests. They are desk checking, structured walk-through, and designs and code inspection.

Desk checking is adopted in unit testing of Sales Force Automation System. Desk checking which involves the module's code is examined for evidence of errors or irregularities. Throughout this checking, several errors and bugs have been identified, including checking for the syntax errors, logic errors, deviations from coding standards or fraudulent code. After the source codes of each module is completed, reviewed, and verified for correct programming syntax, unit testing cases are then designed to challenge its strengths and to ensure it will operate as intended by programmer.

6.3 INTEGRATION TESTING

After all individual components, objects and modules have passed through each correspoding unit test, it is appropriate time to conduct the integration testing. This testing focuses on evaluating groups of program modules primarily to identify whether the system interfaces are defected, and overall, whether they fail to meet the requirement specifications. In this case, SFA system is no different. Similarly, SFA system with integrated modules have to go through integration testing to ensure valid linking and

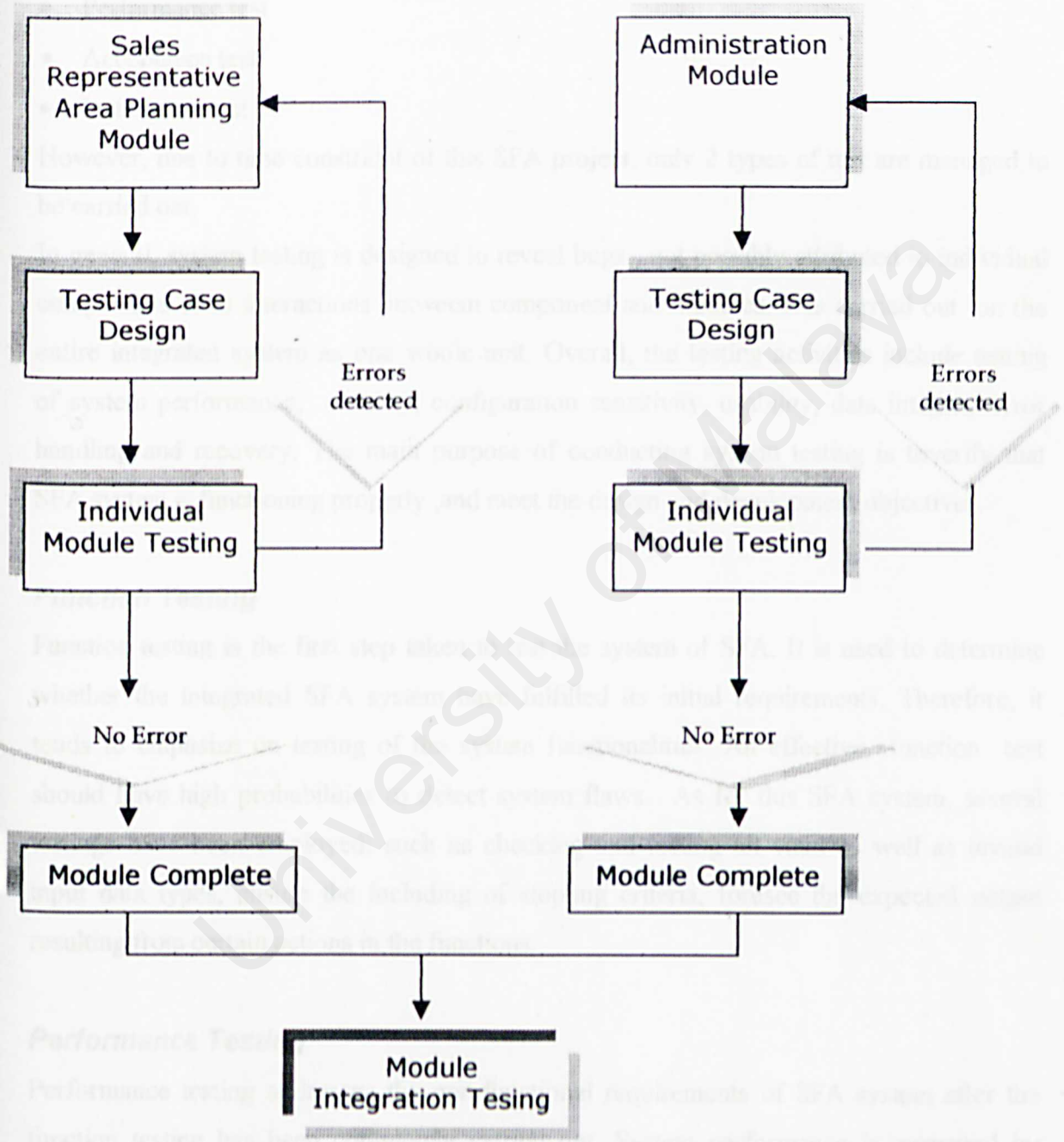
dynamic relationships either between modules of the entire system, or even among sub-modules in each individual module. This will help to identify and ensure the interaction between the specific features and interfaces of the two involved modules.

Two different strategies can be used to undertake integration testing: the big-bang testing and the incremental testings. In this SFA system testing, incremental testing was adopted. Through this incremental testing, subsets of modules (sub-modules) are assembled iteratively and tested until the entire program is finally ready. The reason of applying incremental testing approach rather than choosing big-bang testing is because it has been foreseen that this strategy is much more consistent and explicit to be held, in the sense that all individual modules are well coded, tested individually, and then assembled in total to perform the integration testings.

As for the testing approaches, it normally includes top-down test, bottom-up test, and hybrid test. To ensure that this SFA web-based application coding and design can be carefully tested, hybrid approach is chosen to be adopted. This involves the combination of both top-down and bottom-up tests.

In particular, the specific testings that have been conducted during this phase are: the checking of variables passing, parameters passing of functions, and event procedure calls, inter-module variables and control values passing. Besides, record manipulation and traversing processes are also explicitly tested. All Structred Query Language(SQL) commands are tested through the developed system and validated through execution.

Fig6.1 : Flow Chart of Unit Testing Stage towards Integration Testing Stage for Sales Force Automation System



6.4 SYSTEM TESTING

Pfleeger [Pleeger, 1991] identifies four types of system tests that might be carried out.

- Funtion test
- Performance test
- Acceptance test
- Installation test

However, due to time constraint of this SFA project, only 2 types of test are managed to be carried out.

In general, system testing is designed to reveal bugs , not possibly attributed to individual components or to interactions betweem component and modules. It is carried out on the entire integrated system as one whole unit. Overall, the testing activities include testing of system performance, security, configuration sensitivity, usability, data integrity error handling and recovery. The main purpose of conducting system testing is toverify that SFA system is functioning properly ,and meet the design and development objectives.

Function Testing

Function testing is the first step taken to test the system of SFA. It is used to determine whether the integrated SFA system have fulfilled its initial requirements. Therefore, it tends to emphsize on testing of the system functionalities. An effective function test should have high probabilities to detect system flaws. As for this SFA system, several testings have been employed, such as checking and testing all valid as well as invalid input data types, ensure the including of stoppng criteria, foresee the expected output resulting from certain actions in the functions.

Performance Testing

Performance testing addresses the non-functional requirements of SFA system after the function testing has been completely carried out. System performance is measured by applying performance objectives set by several potential users, as drawn out in the non-functional requirements section defined initially in the early planning stage.

In the case of SFA system, performance testing inspects how effecive the data manipulations are being carried out. It also test out the query speeds, which involves the record retrival, searching and sorting processes. The speed of data loading from the SQL server database is also taken into consideration.

CHAPTER 7 SYSTEM EVALUATION

The last chapter includes problems encountered during the development phase of the Sales Force Automation system and its solutions.

7.1 PROBLEMS ENCOUNTERED AND SOLUTIONS

As this project has to be done within a short span of time and a lot of technical issues need to be resolved, a lot of problems have been encountered. Solutions have been sought during testing and reference check with course mates. Encountering with these problems has been proven to be a valuable learning experience.

Problems And Solutions During System Studies And Analysis

During the system studies and analysis phase, a lot of studies have been carried out. Lack of knowledge in the web application has been a great obstruction.

Difficulty in Choosing A Programming Language

There are many programming languages available in the market, which can be used to develop a web application. To determine which approach to use, seeking advises and views from project supervisor and course mates engaging in similar project are carried out. After much references, studies and surveys, VBScript and ASP are chosen prior to the short time span available to develop this Sales Force Automation System. Therefore, VBScript and ASP will be the most suitable language as it incurs shorter learning curves.

Determining Project Scope

As this involves developing a SFA system for sales representatives, to build a full-fledged system is merely impossible within the given time frame. Inexperience with the current technologies and particular scripting language is another hindrance to implement true workable SFA system for sales representatives use.

Problems And Solutions During System Implementation & Testing

The problem faced during the initial project studies and analysis, were not as crucial compared to the problems faced during implementation and testing period. There are a number of unexpected problems arise during these phases, as described below:

Lack of Mastery In Web-based Programming

As there is no prior mastery and knowledge in programming within a web-based environment, a lot of studies need to be done. New programming languages like VBScript, ASP and Javascript need to be learnt within a short time span. Besides, programming concepts for web application is quite different from the traditional way of programming. However, all these obstacles are resolved through discussions with course mates, supervision form project supervisor and self-studies.

7.2 SYSTEM STRENGTH

Simple of Use

This SFA system for sales representatives is very easy to use. Users can learn how to use this system very fast. It is easy to understand. The simplicity of this system will enable users to perform their tasks easily.

User Friendliness

This system has user friendly interface that will tell the users how to work with this system. The system is developed based on the event-driven programming. Users have the controls of the system function flow by just click on the button. It incorporates a standard homepage with a consistent environment. Moreover, the background colour is set to be the same to make it standard. This user friendly interface will shorten the learning curve of the users.

Password and Privilege Protected Site

This system is a password-protected site. By giving authorized user ID and password, unauthorized users are prohibited from accessing his or her records stored in the database.

This also prevents intruders from intentionally or unintentionally causing vast damages to the system.

Besides, those who access the system with the privilege of an "administrator" will have the privilege to view the entire site, including both the administration and user section. In contrast, those who access the system with only privilege of an "User", will only be allowed to browse through and use the provided functions in certain user-related section, like "Sales Area Planning" and "Search" . Whenever a current user with "User" privilege accidentally click on any of the "Administrator" protected page, he/she will automatically be redirected to the initial login page. This is to avoid non-administrators to simply change various important information like product data and user account management data, without the permission and acknowledgement of any authorized adinistrator.

Reliable System With Effective Error Handling and Recovery

This system is a reliable one as it caters for almost all possible errors encountered. Input by user is validated and verified. For example, a blank entry of required data input or an invalid datatype will be handled by the system by prompting out an error message to inform the user about the error. At the same time, the system would recover from the error and continues to be used.

Relatively Fast Response In Document Retrieval from Server

Each web page is designed to be lightweight. These pages load in a reasonable amount of time to ensure users need not wait too long to view the pages. Heavy graphics and background images are avoided.

Auto-Creatable Database Table for Newly Authorized User

The database of SFA system is totally expandable. Since there is a need to provide a personal data storage space for every user who is authorized to use the SFA System, the system is designed in such a way that it can automatically identify any newly registered user and instantly create a new database table particularly for his/her own use and access, to manipulate his/her personal events and courses.

System Transparency

System transparency refers to the condition where the users do not need to know where the database resides, how the system structure is, its database management system and anything related to the building of the system. For example, the information retrieval and downloading of records are similar to a system accessing the local database. This is to ensure not to confuse users especially users in retrieving information.

7.3 SYSTEM LIMITATIONS

As in other system, there are also several constraints and limitations in the SFA System. These limitations can be addressed in future development and system enhancements.

Browser Limitations

This Sales Force Automation System requires a VBScript support browser for execution at present. User using browser that do not support these features will not be able to use the available functions in the system.

Limited Functionality

This SFA System only allows users, which are the sales persons to do Add, View and Search function in Sales Area Planning section only. However, due to time constraints, the system do not allow them to edit the Sales Area Planning section.

Email Facilities Not Integrated

The email server is not integrated. If the administrator want to reply to users, he/she will have to use other mail facilities, like Microsoft Outlook Express in this case. The message sent cannot be stored in the database.

Output Printing Function Not Integrated

SFA system has not provided users the ability to print query results or other data output like their Call Report Listing and others directly from its application.

7.4 FUTURE ENHANCEMENT

System development has no boundaries as new requirements and better implementation methods continue to arise and evolve. There are several enhancements that could extend the usability of the current version of SFA system, in terms of functionalities and featurers of the developed system in near future.

Interactive & Context-Sensitive Help

Currently, this system does not provide any help function. In future, a help module should be integrated into this system and be an interactive and context-sensitive help so that user seeking help can access the relevant information quickly.

Support Various Types of Popular Browser

As mentioned above, this system requires Internet Explorer and above for execution. In future this system can be fine tuned to fulfill other browser requirements such as Netscape Navigator for execution. This is because Netscape has a sizable share in the browser market besides Internet Explorer.

Integrate With Mailing Capabilities

The current system is not completed with a mail server service. In future a mail server can be incorporated into this system where is allows the administrator to maintain and synchronize the records with users through the administrator module. With this mailing capability, every user can be reached, by the administrator.

7.5 KNOWLEDAGE AND EXPERIENCE GAINED

There have been many types of approach and programming skills learned during the planning, designing, and implementation of this project. Various coding, testing and conversion techniques also being exposed.

During the development cycle of this project, various new programming skills were learned. Even the existing programming skills have also been polished. Among those gained programming languages learned are Javascript and VBScipt. New web technology such as Active Server Pages, and Java Applet were also learned and exposed. These

supporting development tools, such as Microsoft Visual InterDev, Macromedia Dreamweaver UltraDev and so on were also being mastered.

It can be said that it is really a great opportunity and challenge for any student who has passed through the system production procedures. Students have the opportunity to plan, scope,develop, setup, deploy and finally execute a real application system with hand-in or practical experience.

CONCLUSION

Overall, the entire Sales Force Automation System (SFA) designed for the use of sales persons has achieved and fulfilled the initial objectives and requirements as an online system, as determined during system analysis. This system is not only useful to the sales representatives, but it also includes an administrator modules, which had provided a step-by-step insertion wizard to help the administration to systematically add / edit / delete info into database. However, certain part of the previously defined requirements and sub-objectives have been modified and adopted from time-to-time, tailoring the real environment limitation, and personal constraints, such as time constraint. There was a lot of knowledge gained throughout the development of this system. This includes knowledge in web application development, Internet environment, Internet Technologies, programming and concepts as well as database server and web server. Programming using ASP, VBScript , JavaScript and HTML proves to be valuable experience. Interface design using Microsoft Interdev 6.0 provides a good start into web page design. But while programming skills and techniques are important in developing the system, it must not be discounted that in any system development, good software engineering techniques must also be applied. Here, theories and knowledge gained throughout the course of Information Technology studies like System Analysis And Design and Software Engineering literally put into practice. Besides, this project had given me an invaluable experience in managing and developing a project. This project had trained me to become more independent and confident in handling a software project. With the first step taken, enhancements could still be made with more features added for future version. In a nutshell, with project of this nature offered by the faculty, there exist much opportunity to be explored, especially in the field of Internet environment, either for electronic event synchronizing system or in any other fields.

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3. http://www.learnasp.com
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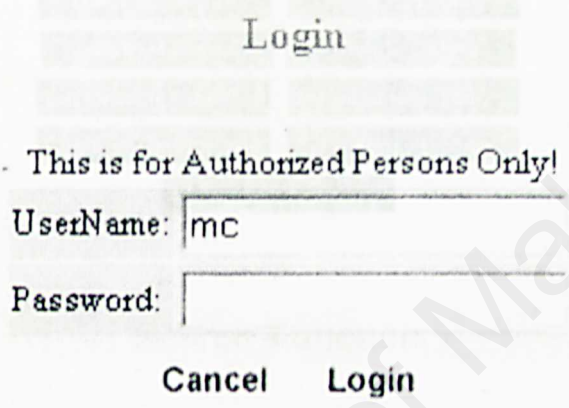
5. http://www.linuxVsNT
6. http://www.microsoft.com/catalog
7. http://www.servlets.com/soapbox/problems-jsp.html
8. http://www.webmonkey.com
9. http://www.whatis.com
10. http://www.zdnet.com/products/stories/reviews/

APPENDIX

USER MANUAL

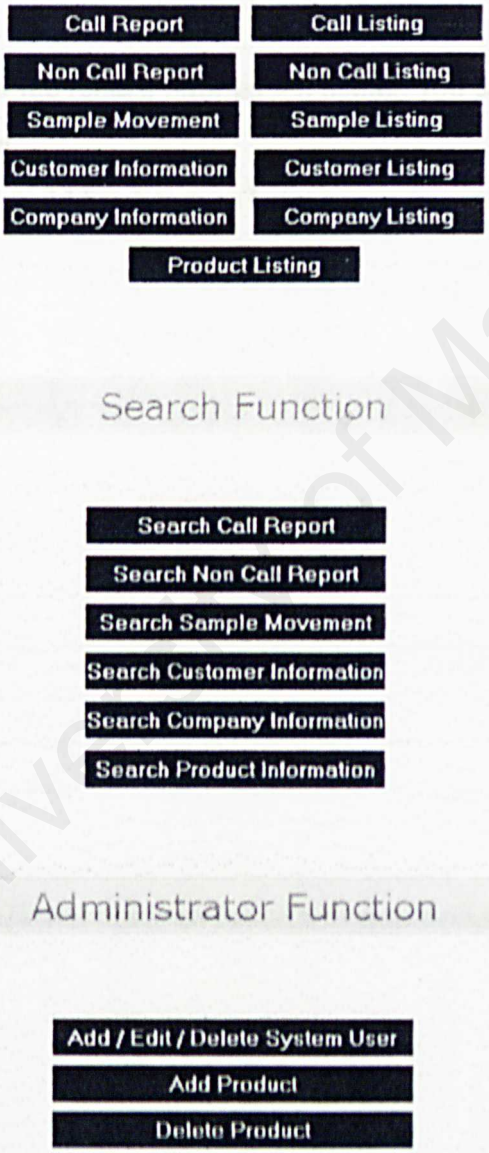
1.When enter the SFA system, a login page would be displayed. So, just enter your user name and password according to your privilege.

Fig8.10 : Login Page



2. If you enter as administrator, then you can use all the function in 3 section. If you enter as a user you can only use the function in the first and second section. But both will go to the same page shown below.

Fig8.11 : Sales Force Automation System



3. There are 3 section : Area Planning, Search and adminitration function.

4. In the first section, got two parts : Add new and view listing.

5. You can add new Call Report, Non-call Report, Sample Movement, Customer Information and Company Information. After you add the related information and click submit, the related listing will be shown. So you can confirm your data has been added into the database.

6. If you just want to view the related information listing, you can click to the related button on the right column.

7. The related interfaces would be shown as below:

Fig8.12 : Add New Call Report

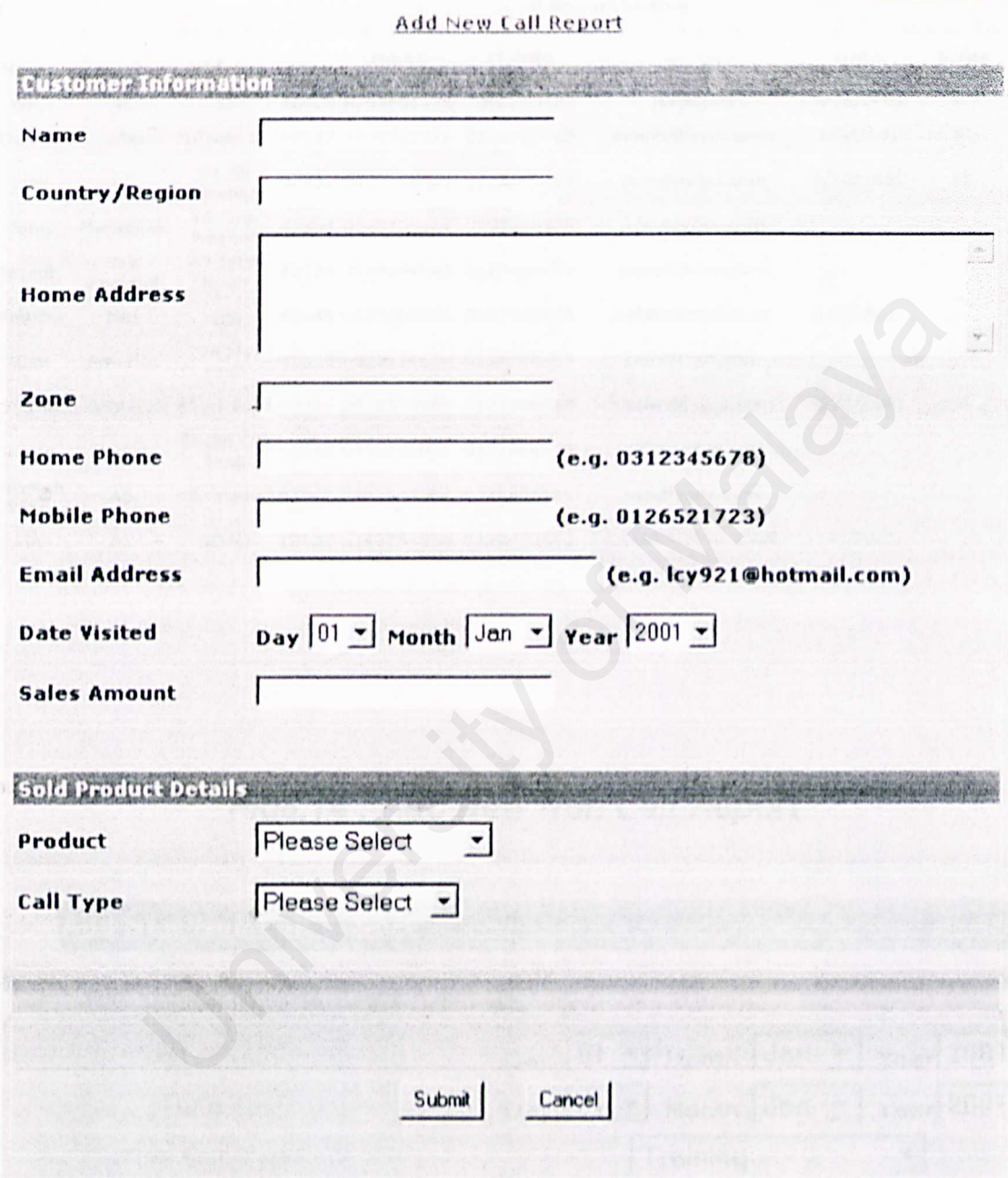


Fig8.13 : Call Report Listing

Call Report Listing

Name	Country	Address	Zone	Home Phone	Mobile Phone	Email	Date Visited	Sales Amount	Product	Call Type
cmc	AS	as	46475	8792681735	7896875687	jkl@gj.cd	8/26/2001	67	comics	Brochure
Dennis	Sibu	10,sec 17	68757	7856757576	0122786757	dennis@lycos.com	1/3/2001	34	History	Video Show
Jack	KL	54,Jln Ibrahim	32432	0489796509	0124658697	jack@deitel.com	5/10/2001	23	Cooking Recipe	Brochure
John	Mentakab	76,Tmn Mayang	43534	0945355464	0197865578	john@lycos.com				
Joseph	New Zealand	67,Ipoh Road	43536	0934534543	0129089779	joseph@ibm.com				
Patricia	Miri	gjgj	45646	0379695858	0127868475	pat@hotmail.com	1/1/2001		Please Select	Please Select
Sam	America	76,rfg road	43538	0323534566	0136868699	sam@DoIt.com				
Shawn	England	45,ry road	78968	0978575969	0127986868	shawn@lycos.com	9/28/2001	56	Cooking Recipe	On Site Display
Susan	Melaka	56,Jln Chi Jang	43540	0435456566	0107866533	susan@creative.com.my				
Tan Kok Seng	AS	45,ry road	43542	0743543564	0176696970	tan@lycos.com				
vin	AS	SDAD	12132	3243254354	0123453543	DE@HOTMAIL.COM	3/3/2001		Cartoon	Video Show

Fig8.14 : Add New Non Call Report

Add New Non Call Report

Staff ID :	
Date From :	Day 01 Month Jan Year 2001
Date To :	Day 01 Month Jan Year 2001
Non Call Type :	Training

Submit Cancel

Fig8.15 : Non Call Listing

Non Call Listing

Staff ID	Date From	Date To	Non Call Type
ABC123	1/1/2002	1/1/2002	Sick
ABC124	3/29/2001	4/4/2001	Annual Leave
ABC23	1/1/2001	3/3/2001	Training
ABC43	1/1/2001	2/1/2001	Emergency Leave
ABC45	1/6/2001	3/6/2001	Sick
ABC46	1/2/2001	2/3/2001	Annual Leave
ABC787	1/1/2001	3/3/2001	Training
ABC90	4/10/2001	10/11/2001	Training
ABC92	3/6/2001	3/6/2001	Sick
ABC94	7/12/2001	8/12/2001	Emergency Leave
ABC96	1/1/2002	2/2/2002	Training
WER34	1/1/2001	1/1/2001	Annual Leave

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Fig8.16 : Add New Sample Movement

Add New Sample Movement

Sample :	
Type :	
Lot Number :	
SIR/SOF Number :	
Date :	Day 01 Month Jan Year 2001
Quantity On Hand :	
Number Given :	
From :	
To :	

Submit Cancel

Fig8.17 : Sample Movement Listing

Sample Movement Listing

Sample	Type	Lot Number	SIR/SOF Number	Date	Quantity On Hand	Number Given	From	To
Cartoon	entertainment	12349	98769	10/6/2001	45	23	Alex	Pat
Chemistry	reference	12351	98771	8/26/2001	646	26	Gerald	Wang
Chinese	comics	12345	98765	4/24/2001	43	12	Avin	Wan Seng
Comics	entertainment	12348	98768	12/24/2001	56	23	Soon	Avin
Cooking Recipe	cooking	12347	98767	6/5/2001	65	34	Sam	Dick
Creative	skills	12353	98773	10/30/2001	46	12	Susan	Adeline
Drawing	skills	12354	98774	9/6/2001	75	13	Vincent	Lex
DSDD	WE	231344345	432434535	1/1/2001	23	2	MINGCHIN	WAN
Environmental	reference	12352	98772	9/1/2001	67	22	Peng	Seng
History	reference book	12346	98766	1/5/2001	67	20	Jordan	Crystal
History	reference	12350	98770	7/25/2001	87	22	Desc	Johnnes
Mathematics	reference book	12360	98780	1/1/2001	54	23	Avin	mc

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Fig8.18 : Add New Customer

Add New Customer

Customer Information

Name

Country/Region

Home Address

Zone

Company

Home Phone (e.g. 0312345678)

Mobile Phone (e.g. 0126521723)

Email Address (e.g. lcy921@hotmail.com)

Submit Cancel

Fig8.19 : Customer Listing

Customer Listing

Name	Country	Address	Zone	Company	Home Phone	Mobile Phone	Email
cmc	AS	as	46475	Dick	8792681735	7896875687	jkl@gj.cd
Danny	Cheras	43,Jln Duta	54636	Viztel	0376758697	0127867857	danny@mailcity.com
Dennis	Sibu	10,sec 17	68757	Louis	7856757576	0122786757	dennis@lycos.com
Jack	KL	54,Jln Ibrahim	32432	Serf	0489796509	0124658697	jack@deitel.com
John	Mentakab	76,Tmn Mayang	34353	Intel Inc	0789787457	0128768586	john@lycos.com
Joseph	New Zealand	67,Ipoh Road	79067	IBM	0689778696	0165756970	joseph@ibm.com
Patricia	Miri	gjgj	45646		0379695858	0127868475	pat@hotmail.com
Sam	America	76,rfg road	78768	DoIt Inc	0868658689	0197868858	sam@DoIt.com
Shawn	England	45,ry road	78968	shawn Sdn Bhd	0978575969	0127986868	shawn@lycos.com
Susan	Melaka	56,Jln Chi Jang	76868	Creative Sdn Bhd	0689785685	0176869699	susan@creative.com.my
Tan Kok Seng	AS	56,Jln Chi Jang	65575	Tan Sdn Bhd	0476865859	0136868689	tan@lycos.com
vin	AS	SDAD	12132		3243254354	0123453543	DE@HOTMAIL.COM

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Fig8.20 : Add New Company

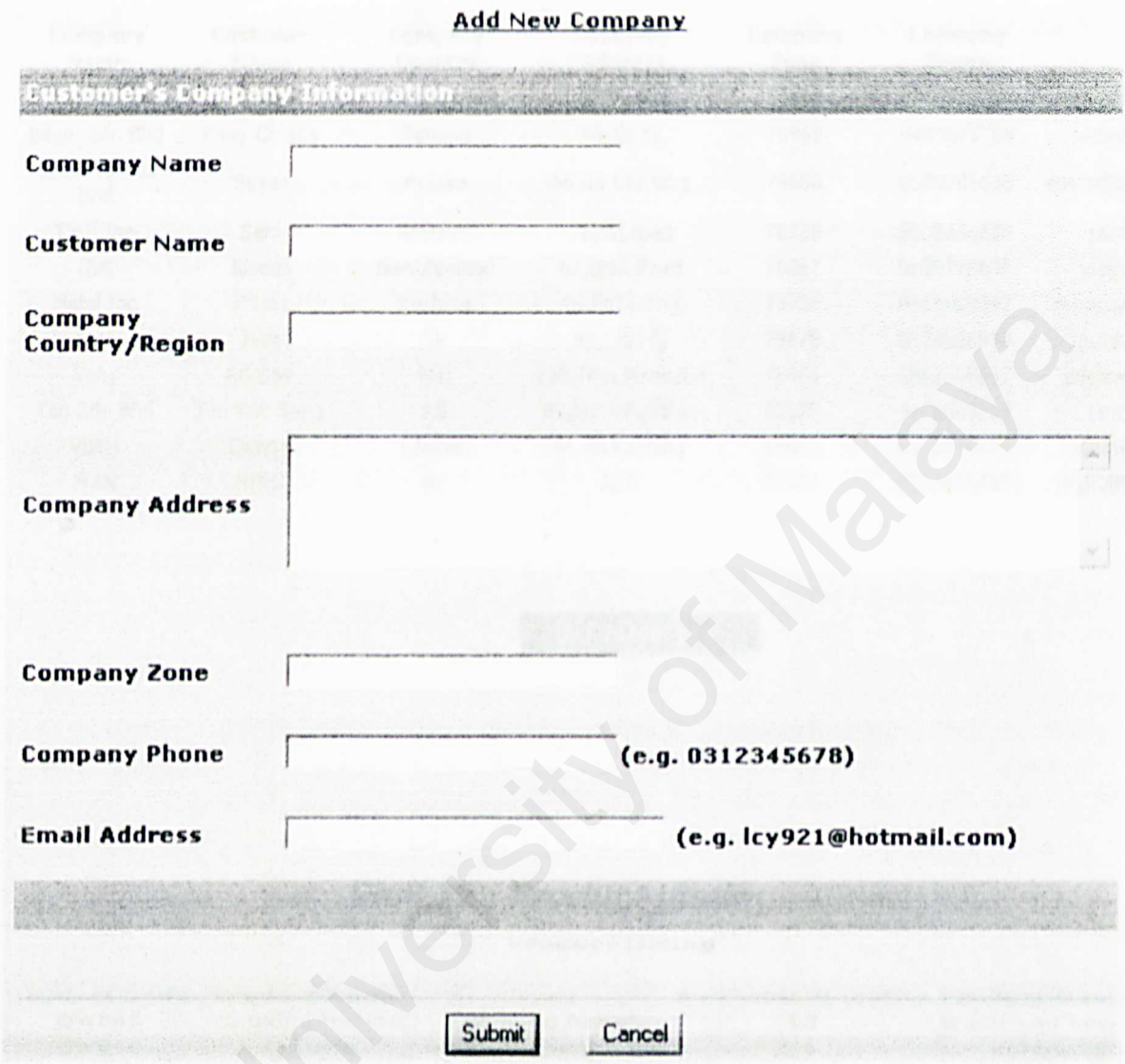

Fig8.21 : Company Listing

Company Listing

Company Name	Customer Name	Company Country	Company Address	Company Zone	Company Phone	Email
Azide	Erica	Terengganu	87,Jln Mat	76869	0768575589	erica@azide.com.my
bihun Sdn Bhd	Poay Chiang	Penang	45,Jln KL	78969	0489675758	poay@hotmail.com
Creative Sdn Bhd	Susan	Melaka	56,Jln Chi Jang	76868	0689785685	susan@creative.com.my
DoIt Inc	Sam	America	76,rfg road	78768	0868658689	sam@DoIt.com
IBM	Joseph	New Zealand	67,Ipoh Road	79067	0689778696	joseph@ibm.com
Metal Inc	Moses	Kuching	76,JlnTanling	78686	0865859697	moses@metal.com.my
Serf	Jack	SP	90,Tmn fg	79878	0378585970	jack@serf.com.my
Sony	Adeline	Miri	785,Tmn Manduka	78686	0868558697	adeline@yahoo.com
Tan Sdn Bhd	Tan Kok Seng	AS	89,Jln Pangkalan	65575	0476865859	tan@lycos.com
Viztel	Danny.	Cheras	54,Jln Kuching	78685	0378576475	danny@viztel.com
WAN	MING	as	ABC	21324	0323425435	GHJG@HOTMAIL.COM

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Fig8.22 : Product Listing

Product Listing

Product Code	Product Name	Type	Available Quantity	Product Description
QWE45	Cooking Recipe	cooking book	90	teach you how to cook
QWE46	Comics	entertainment book	76	entertainment
QWE47	Cartoon	entertainment book	45	entertainment
QWE48	History	reference book	76	primary UPSR book
QWE49	Chemistry	reference book	34	SPM book
QWE50	Environmental	reference book	766	SPM book
QWE51	Creative	design book	34	skills
QWE52	Drawing	drawing book	24	skills
QWE53	Motivate Yourself	motivation book	57	motivation
QWE54	Winning The Race	motivation book	65	motivation

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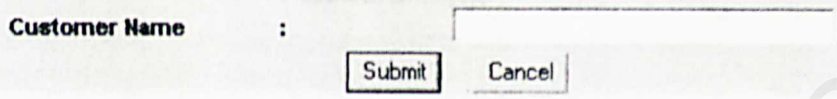
8. The second section has search function.

9. You can click the related field to search for the related information. It will be shown in listing format.

10. All the interfaces are the same. So only one of them would be shown as an example.

Fig8.23 : Call Report Search



11. The third section can only be accessed by the administrator.

12. They can add/edit/delete system user and add/delete product.

13. The related interfaces would be shown as below:

Fig8.24 : Add / Edit / Delete System User

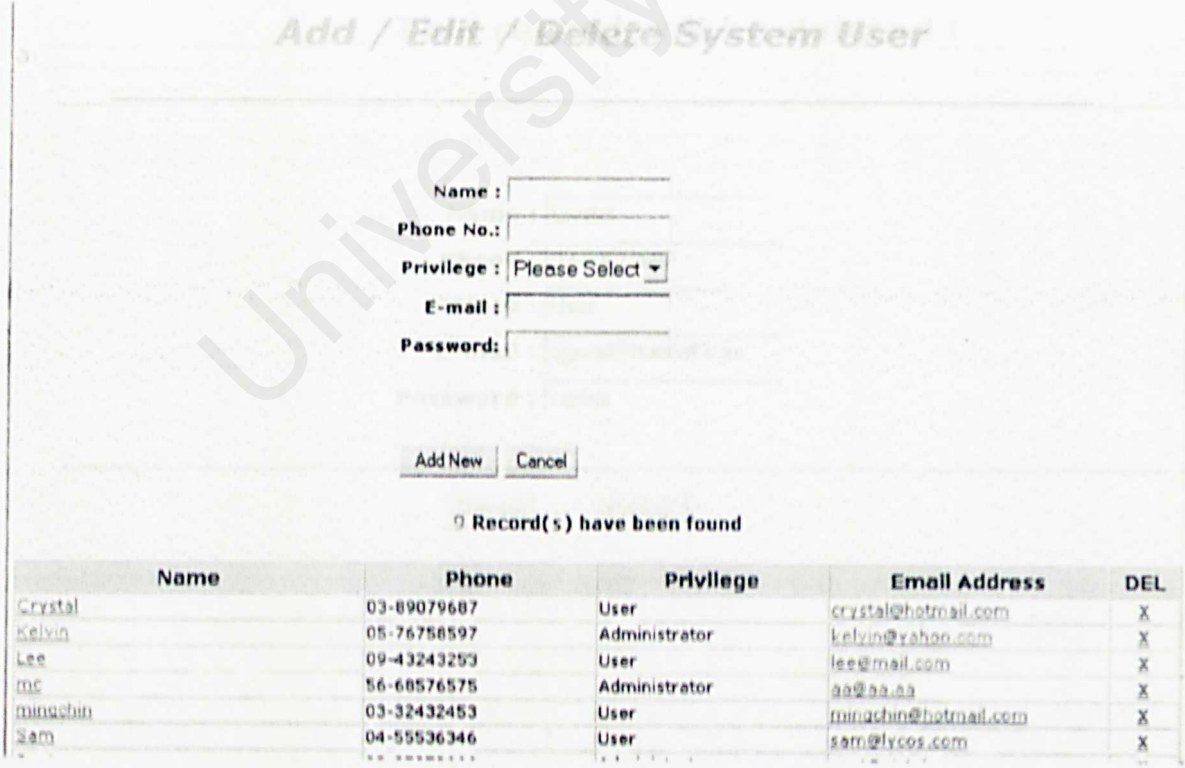


Fig8.25 : Edit System User

Fig8.26 : Delete System User

Fig8.27 : Add New Product

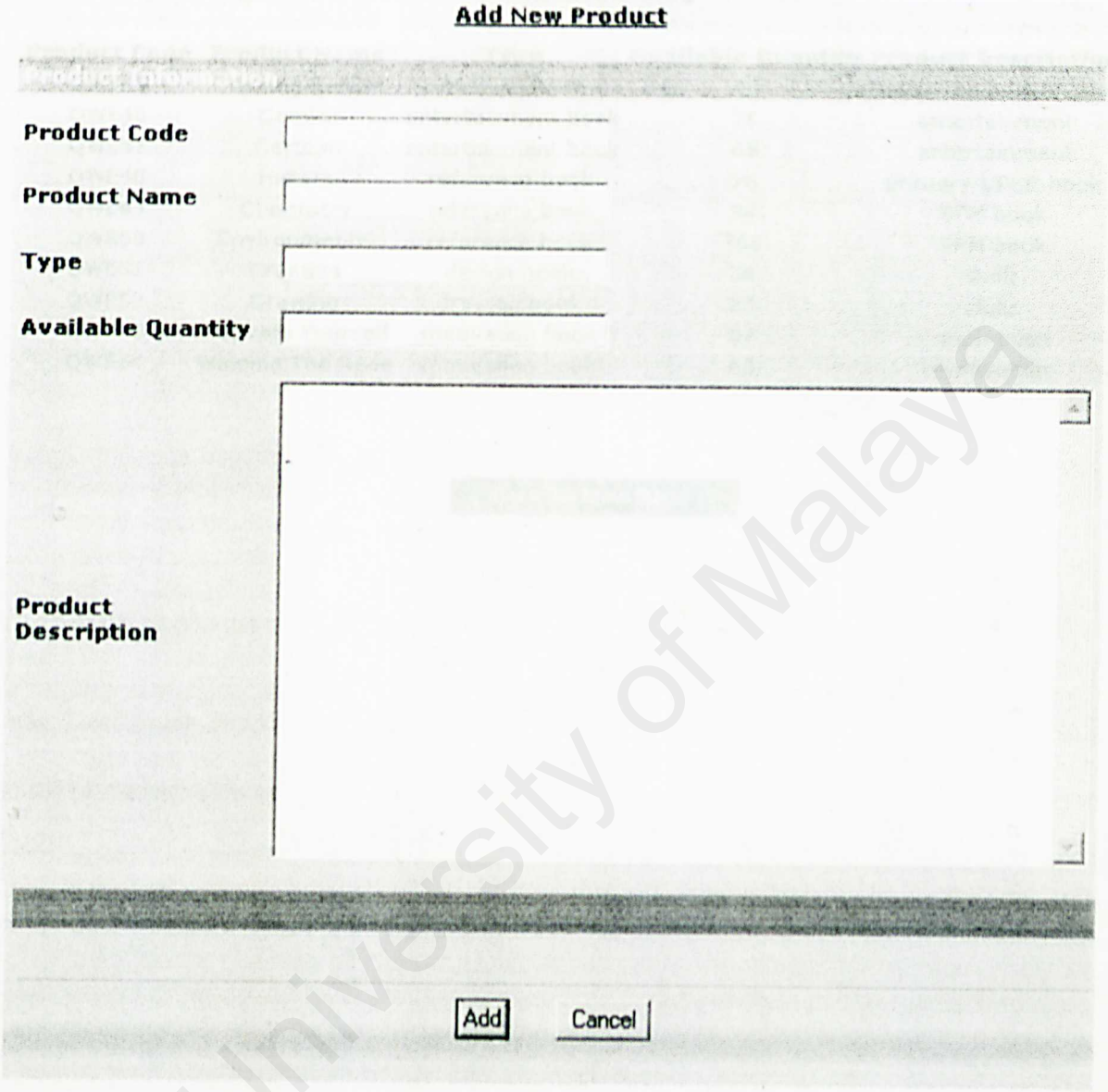


Fig8.28 : Delete Product

Product Listing

Product Code	Product Name	Type	Available Quantity	Product Description	Del
QWE45	Cooking Recipe	cooking book	90	teach you how to cook	X
QWE46	Comics	entertainment book	76	entertainment	X
QWE47	Cartoon	entertainment book	45	entertainment	X
QWE48	History	reference book	76	primary UPSR book	X
QWE49	Chemistry	reference book	34	SPM book	X
QWE50	Environmental	reference book	766	SPM book	X
QWE51	Creative	design book	34	skills	X
QWE52	Drawing	drawing book	24	skills	X
QWE53	Motivate Yourself	motivation book	57	motivation	X
QWE54	Winning The Race	motivation book	65	motivation	X

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Problems And Solutions During System Implementation & Testing

The problem faced during the initial project studies and analysis, were not as crucial compared to the problems faced during implementation and testing period. There are a number of unexpected problems arise during these phases, as described below:

Lack of Mastery In Web-based Programming

As there is no prior mastery and knowledge in programming within a web-based environment, a lot of studies need to be done. New programming languages like VBScript, ASP and Javascript need to be learnt within a short time span. Besides, programming concepts for web application is quite different from the traditional way of programming. However, all these obstacles are resolved through discussions with course mates, supervision form project supervisor and self-studies.

7.2 SYSTEM STRENGTH

Simple of Use

This SFA system for sales representatives is very easy to use. Users can learn how to use this system very fast. It is easy to understand. The simplicity of this system will enable users to perform their tasks easily.

User Friendliness

This system has user friendly interface that will tell the users how to work with this system. The system is developed based on the event-driven programming. Users have the controls of the system function flow by just click on the button. It incorporates a standard homepage with a consistent environment. Moreover, the background colour is set to be the same to make it standard. This user friendly interface will shorten the learning curve of the users.

Password and Privilege Protected Site

This system is a password-protected site. By giving authorized user ID and password, unauthorized users are prohibited from accessing his or her records stored in the database.